Tree Species in Pilot Forest



Kenya/Japan

Social Forestry Training Project

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5th May 1992

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FORWARD

This booklet incorporates comprehensive information on the performance of exotic and indigenous tree species that have been evaluated in Kwa-Vonza location trial plantation site in Kitui District. The information is presented by Cards and cover relevant bio-physical data on individual species, phenological development and opportunities for raising given species from seedlings to the plantation stage.

We are confident that all serious readers will find this booklet useful in their work. But you are all challenged to use it as a working tool. In this regard, you are requested to record your experiences and to document any missing information and to forward such material to the authors. It is particularly fitting to recognize the outstanding support that has been provided by Mr. Hiroji Okabe, the Chief Advisor to the project in putting this document together. Special appreciation go to JICA for supporting both the project and the production of this booklet. We urge all Kenyan communities to plant trees in their holdings and to support the development of social forestry countrywide for improved conservation of the environment and biodiversity.

J. A. Odera

DIRECTOR, KEFRI

ACKNOWLEDGEMENT

I wish to acknowledge professional support provided to the project by Professor Sumihiko Asakawa of Tamagawa University, Japan, who visited the project on several occasions as a short-term silvicultural expert; Mr. Yoshihiko Watanabe, Pilot Forest Leader, Kitui Team, who prepared many basic reports used in the final text; Mr. Mitsuo Takahashi and other Japanese experts who have worked in the Pilot Forest. To them, my thanks are due. I also wish to thank Mrs. Caroline Sikuku for typing the cards.

In preparing this document a lot of information has been drawn from different sources, particularly the following:

- A: Noad T.C. and Birnie A. Trees of Kenya, 1989
- B: Teel Wayne; A Pocket Director of Trees and Seeds in Kenya, Kenya Energy Non-Governmental Organizations, 1988.
- C: Nettai-Shokubutzu Kenkyukai: Nettai-Shobutzu-Yoran 2nd Ed. 1986.
- D: Carlowitz Peter G.; Multipurpose Tree and Shrub Seed Director, ICRAF, First Ed. May, 1986.
- E: Kokwaro J.O.; Medicinal Plants of East African Literature Bureau, First Published 1976.
- F: Gachathi F.N.; Kikuyu Botanical Dictionary, First Published 1989.
- G: National Academy of Sciences; Firewood Crops, Washington D.C. USA, 1990
- H: Kenya Forestry Research Institute; A Guide to Trees Planting in Kenya, 1990.
- I: Von Maydell Hans-J; Trees and Shrubs of The Sahel, GTZ, 1986.

May 5, 1992

Hiroji Okabe Chief Advisor of Social Forestry Training Project.

SUMMARY

The Kenya/Japan Social Forestry Training Project is composed of two sub-projects: The Social Forestry Training Scheme and The Pilot Forest Scheme. The Pilot Forest Scheme has been implemented since November, 1986, under the Special Measure Fund from the Government of Japan through Japan International Co-operation Agency (JICA). The project has established about 340 ha of trial plantations from 1986 to 1991. The aims of the pilot forest activities are to evaluate suitable tree species for planting in the semi-arid environment in Kitui district and to develop improved tree planting techniques for satisfactory survival and crop development in the area. It is also expected that the result of the trial plantation will act as a model and growth point for social forestry development in the semi-arid land areas.

From its inception in 1987 to 1989, the project has raised seedlings of over 50 different tree species in Tiva nursery, the majority of which have been planted in the pilot forest site. Recognising that the trial embraces pioneer planting of indigenus and exotic species, it is important to study and document their characteristics in order to understand their growth patterns and habits. It is for this commitment that the available information has been presented by cards for each species. Although this booklet covers only those species that have been studied in the pilot forest scheme, the information will not only be useful to the pilot forest but the result of this work will indoubtedly be beneficial to the development of tree planting in the semi-arid land areas in Kenya and elsewhere.

Introduction

Compiling this booklet of tree species cards, the reporter aims at collecting some data which will be useful to plant trees in and around Kwavonza location/division, Kitui District, in which Pilot Forest Scheme is carried on as a sub-project of Kenya/Japan Social Forestry Training Project.

However, limiting only data which are useful in Kwa-vonza location, located in semi-arid area, the reporter should limit to make cards, as only some tree species will be able to be planted and grown in and around there, he collected data of tree species risen up at Tiva Nursery, nursery for Pilot Forest of The Project. Consequently, some tree species listed up this booklet are not always adequate to plant in and around Kwa-vonza location. There are some adequate tree species to plant there, however, many species are not adequate.

As the reporter wants only to collect data of tree species without his opinion, he is afraid of some contradiction in each data. Because of some data got under certain conditions, if the condition would change, the conclusion would also change. However, the reporter wants only to collect data, even though there are some useful data bases.

The following are notes for using the booklet.

- 1. The reporter made a form at first, then he filled each item, therefore there are many blank spaces in the cards, the reporter is expecting to fill the blank spaces in the near future. However in item of utilization 1 basic data (9) in card, the reporter omitted soil conservation, wind breaker, soil improvement, water control, etc, because these utilizations are common in every tree species.
- 2. In item of climatic condition (1 Basic data, (5)), as the climatic condition is a very important factor for exotic tree species to the success in plantation, the reporter collected climatic data for the species from the following five books:

a) Preferred climate types

Preferred climate types are quoted "A Pocket Dictionary of Tree and Seeds in Kenya" (Teel Wayne, 1988). According to the above mentioned book, the climate zones, based on agro-climatic zones, are divided into seven zones based on precipitation and potantial evaporation. And also it identifies nine temperature zones. Since the precipitation and the temperature zone overlap, this creates 33 separate agro-climate zones. Pilot Forest belongs to V-2 in the agro-climatic zone.

b) The climate adaptability

The climate adaptabilities are quoted from "Multipurpose Tree and Shrub Seed Directory" (Carlowitz Peter G., 1986). Many things are quoted from this book for compiling these cards collection.

c) The Kenya's Ecological Zone

The Kenya's Ecological Zones are quoted from "A Guide to Tree Plantation in Kenya" (Kenya Forestry Research Institute, 1990).

According to the booklet, the ecological zones are divided into seven zones by precipitations. Ecological zone I to VII have been excluded because currently there is hardly any tree planting taking place in these zones. The remaining five occasions are aimed at receiving annual precipitation as follows:

Ecozone II Over 1400 mm

III 800 to 1400 mm

IV 400 to 800 mm

V&VI Less than 400 mm

Pilot Forest belongs to Ecozone III or IV.

(d) Environmental Requirements.

The environmental requirements are quoted from:

"Firewood Crops" (National Academy of Science, 1990)

(e) Site Requirements.

Site requirements are quoted from:

"Trees and Shrubs of the Sahel" (Von Maydell Hans-J, 1986).

3. In 4(9) of Card, if there are planted year of 1988 and 1989, survival rate and height researched in October 1990 of planted 1988, in November 1990 planted 1989 mainly.

CONTENTS

Page	e
FORWARD	i
AKNOWLEDGEMENT ii	
SUMMARY iii	Ĺ
INTRODUCTION ix	7
The species mainly planted in Pilot Forest	1
Acacia abyssinica	3
A. albida	6
A. auriculiformis	9
A. gerrardii	1
A. holocericea	4
A. nilotica	6
A. pendula	0
A. polyacantha 2	2
A. salicina	5
A. senegal	7
	0
	4
Acrocarpus fraxinifolius	6
Albizia amara	19
A. anthelmintica 4	. 1
Azadirachta indica 4	.3
	17
	50
	54
Casuarina equisetifolia 5	57
Croton megalocarpus	31
Dalbergia melanoxylon	34

Delonix regia 67
Eycalyptus camaldulensis 69
E. citriodora 72
E. paniculata
E. tereticornis
Gmelina arborea
Grevillea robusta
Leucaena leucocephala
Melia azedarach
M. volkensii
Moringa stenopetala 92
Parkinsonia aculeata
Prosopis juliflora
Schinus molle
Sesbania grandiflora
S. sesban
Tamarindus indica
Terminalia brownii
T. catappa
T. mentalis
T. prunioides
T. spinosa
Trichilia roka

The species mainly planted in Pilot Forest

	Family	Origin
Acacia abyssinica	Mimosaceae	Indigenous
A. albida	ditto	ditto
A. auriculiformis	ditto	Australia >
A. gerrardii	ditto	Indigenous
A. holoselicea	ditto	Australia ~
A. nilotica	ditto	Indigenous
A. pendula	ditto	Australia
A. polyacantha	ditto	Indigenous
A. salicina	ditto	Australia
A. senegal	ditto	Indigenous
A. tortilis	ditto	ditto
A. xanthophloea	ditto	ditto
Acrocarpus fraxinifolius	ditto	India, South-East Asia
Albizia amara	ditto	Indigenous
A. anthelmintica	ditto	ditto
Azadirachta indica	Meliaceae	India, Sri-Lanka 🖊
Balanites aegyptiaca	Balanitaceae	Indigenous
Cassia siamea	Caesalpinacae	South-East Asia, India
C. spectabilis	ditto	Tropical America
Casuarina equisetifolia	Casuarinaceae	Indigenous
Croton megalocarpus	Euphorbiaceae	Indigenous
Dalbergia melanoxylon	Papilionaceae	ditto
Delonix regia	Caesalpinaceae	Madagascar
Eucalyptus camaldulensis	Myrtaceae	Australia
E. citriodora	ditto	ditto -
	A. albida A. auriculiformis A. gerrardii A. holoselicea A. nilotica A. pendula A. polyacantha A. salicina A. senegal A. tortilis A. xanthophloea Acrocarpus fraxinifolius Albizia amara A. anthelmintica Azadirachta indica Balanites aegyptiaca Cassia siamea C. spectabilis Casuarina equisetifolia Croton megalocarpus Dalbergia melanoxylon Delonix regia Eucalyptus camaldulensis	Acacia abyssinica Mimosaceae A. albida ditto A. auriculiformis ditto A. gerrardii ditto A. holoselicea ditto A. nilotica ditto A. pendula ditto A. polyacantha ditto A. salicina ditto A. senegal ditto A. tortilis ditto A. xanthophloea ditto A. xanthophloea ditto A. anthelmintica ditto A. anthelmintica ditto Casuarina equisetifolia Casuarinaceae Croton megalocarpus Euphorbiaceae Dalbergia melanoxylon Delonix regia Caesalpinaceae Eucalyptus camaldulensis Myrtaceae

No.	Species	Family	Origin
26	E. paniculata	ditto	ditto /
27	E. tereticornis	ditto	ditto
28	Gmelina arborea	Verbenaceae	South Asia, India
29	Grevillea robusta	Proteaceae	Australia /
30	Leucaena leucocephala	Mimosaceae	Central America
31	Melia azedarach	Meleaceae	Western Asia, Himalayas
32	M. volkensii	ditto	Indigenous
33	Moringa stenopetala	Moringaceae	ditto
34	Parkinsonia aculeata	Casalpinaceae	Tropical America
35	Prosopis juliflora	Mimosaceae	South-Western America
36	Schinus molle	Anacardiaceae	Peru Andes
37	Sesbania grandiflora	Papilionaceae	Tropical America
38	S. sesban	ditto	Indigenous
39	Tamarindus indica	Caesalpinaceae	ditto
40	Terminalia brownii	Combretaceae	ditto
41	T. catappa	ditto	Andaman Island, India
42	T. mentalis	ditto	Indigenous
43	T. prunioides	ditto	ditto
44	T. spinosa	ditto	ditto
45	Trichilia roka	Meliaceae	ditto

Species: Acacia abyssinica

Cf. A:163, B:60, C:-, D:-, E:-, F:61, G:-, H:-, I:-

1 Basic data

(1) Family name : Mimosaceae

(2) Vernacular name : Mugunga, Mugaa(Kikuyu)

(3) Origin : Indigenous

(4) Climatic condition

a. Preferred climatic type(B):

	a. Freierr	ed cimacic	cy PC(D).		
Zone	Climatic type	Prec.	Evap.	Temp.	Alt.
	Kakamega(part)	1100-1700	1200-2000	18-20	1500-1850
	Kericho	1100-1700	1200-2200	14-18	1850-2450
		1100-1700	1200-2200	12-14	2450-2750
100000000000000000000000000000000000000	Mountain	The state of the s		12-14	1500-2750
11,4-7	' Limuru	1000-1600	1300-2100		1850-2150
111.5	Nairobi(part	800-1400	1450-2200	16-18	
	7 ELdoret	800-1400	1450-2200	12-16	2150-2750

Note; Prec. Average annual rain fall, mm

Evap. Average annual potential evaporation, mm

Temp. Mean annual temperature, (deg.C)

Alt. Altitude, m

b. Climate adaptability(D) : No data

c. Preferable ecological zone (H) : No data
d. Environmental requirements(G) : No data
e. Site requirements (I) : No data

(5) Distribution in Kenya

: Occurring at the edges of highland forest down to Limuru and Muguga and wooded grassland from 1,800 to 2,400 m, common in Western Province(A)

- (6) Soil characteristics
- (7) Shade tolerance
- (8) Mature tree's height : 16 to 20 m(A).
- (9) Mature tree's diameter
- (10) Utilization : Ornamental(A), Fodder(B)
 (11) Others : Nitrogen-fixation
- (11)

Seed

2

- (1) Month of flowering
 - (2) Month of collection
 - (3) Method of collection
 - (4) Method of preparation

: Seed is quite small and highly subject to beetle attack while in the pod on the tree. Damaged seeds should be separated by floating. Undamaged seeds should be dried in the sun to kill the remaining larvae(B).

(5)	and	re in a cool, dry insect-free place, d viability should be good a long riod(B)
(6) (7) (8) (9) (10)	Number of seeds per a pod Usual germination rate Number of seeds per kg. or 1 Provenance	:
Seed	dling	
(1)	Applied seed pretreatment	: Seed can be nicked or soaked 24 hours prior to sowing(B).
(2)	Types of seedling a. Potted seedling b. Stump c. Bare root	: Operational : Not examined : Not examined
(3) (4) (5) (6)	Growing speed in the nursery	
Plan	ntation	
(1) (2)	Land Preparation : (i) slas dov D.B (ii) slas	In 1988 strip, clearing, 1m width shing and 2m remaining, but not cut wn useful trees more than 5cm in .H. In 1989, strip clearing, 2m width shing and 1m remaining, the same (i) for useful trees.
(3)	Number of seedlings per ha	: (i) In 1988, 1,000 seedlings/ha planted. (ii) In 1989, 830 seedlings/ha planted.
(4)	Size of planting hole	(i) In 1988, 45cm x 45cm. (ii) In 1989, 65cm x 65cm.
(5)	Weeding	: Weeding is very important, at least 2 times per year, if possible 3 times.
(6) (7)	Damage Growing speed	: Medium to fastgrowing(B), Fairly
(8) (9)		fast growing(A). : Survival rate Height Nov.89 Oct.90 Oct.91 Oct.90 Cm cm
	1988 I-G 0.59 15.5 1989 B-I-4(L) 0.61	1.5 – 30.5 6.5 49 56

Note: Hole size is 65cm x 65cm

- (10) Some data from extension
- (11) Others

Species: <u>Acacia</u> <u>albida</u>

Cf. A:163, B:61, C:- D:14, 130, 156, E:123, F:-, G:-, H:11, I:100

Basic data 1

: Mimosaceae Family name (1)

(2) Vernacular name : Olasiti(Masai), Mukababu(Taveta)
(3) Origin : Indigenous

(4) Climatic condition

Preferred climatic type(B):

Zone IV, 1	a. Preferro Climatic type Lamu	ed climatic Prec. 600-1100	Evap. 1550-2200	Temp. 24-30	Alt. 0- 900
IV, 2-3 V, 1-2 V, 3	Lake Victoria/ Thika Taveta/Isiolo Kajiado(part)	600-1100 450- 900 450- 900	1550-2200 1650-2300 1650-2300 1900-2400	20-24 22-30 20-22 22-30	900-1800 0-1200 1200-1800 0-1200
VI, 1-2 VII, 1-3	Magadi/Garba Wajir	300- 500 150- 350	2100-2500	20-30	0-1800

Note; Prec. Average annual rain fall, mm

Evap. Average annual potential evaporation, mm

Temp. Mean annual temperature, (deg.C)

Altitude, m Alt.

b. Zone	. Climate Prec.	adaptabilit Dry p Dry months	eriod	Mean	Temperature Lowest	Highest
Subhumid	600-1500	4- 8	1		>18	
Semi-arid;						
hot	250- 600	8-10	1 or 2	>18		
Arid, hot				. 10		
desert	<250	11-12	1	>18		
Arid, warm		44.40	4	\10		
to cold	<250	11-12	1	>18		
Humid sub-	1000		None		-3 <t<18< td=""><td>>22</td></t<18<>	>22
tropics	>1200	-	None		-3/6/10	,
Temperate maritime	>1200	_	None		-3 <t<18< td=""><td>10-20</td></t<18<>	10-20

Note; Prec. : Average annual rainfall, mm Dry months: Total number of dry months (<50 mm) per year No. of DP: Number of dry period per year

c. Preferable ecological zone(H):

Eco. zone	Rainfal(mm)	Altitude(m)	Soil type	Rotation
IV	400-800	1,000-1,400	Sandy to sandy-clay	Short
			soils to riverine	
			Clay/sandy soil	

Environmental requirements(G): No data

- Site requirement: This species is very adaptable, growing under precipitation of less than 300 mm upto 1,800 mm and survives extended dry period (even for several years), as well as several weeks of inundation(I).
- : 550 1800m. Riverine in dry area or Distribution in Kenya where the water table is near the surface. (A)
- : It occurs permeable sandy or silty soils (6) Soil characteristics where the water table is accessible to the tree roots, and this species is not dependent on local rainfall once it is established. It does not grow well on lateritic soil or with impeded drainage (A,B). Loam and sand in soil texture, neutral(6.5 - 7.5) in reaction, well drained in drainage, salinity.(D)
- (7)Shade tolerance
- Mature tree's height (8):
- Mature trees' diameter (9)
- : Fodder, building(A), fuelwood/charcoal, (10)Utilization

house-hold utensils, poles/posts,

timber(D).

Site improvement, forage, tools, tannin (from bark) but less suitable as fuelwood or for charcoal(I).

: Nitrogen-fixation. (11) Others

2 Seed

- (1)Month of flowering
- : November-December in Kibwezi (2)Month of collection
- : To collect pods under a tree, or fall Method of collection (3)them to the ground by rocking or hitting by pole then collect them.
- : After dry pods, then put in to a sack (4) Method of preparation and hit by a pole.
- : Seeds will store almost indefinitely (5)Method of storage dry, cool storage free of insect. (B)
- Number of seeds per pod (6)
- Number of seeds per kg. or 1. : 11,000 Seeds/kg.(B) (7)

20,400 - 40,000 Seeds/kg.(D),

11,500 seed/kg(I).

- : 45 75 % Usual germination rate (8)
- (9)Provenance
- (10)Others

3 Seedling

- Applied seed pretreatment: The seed can be nicked or soaked in water 24 hours. (B) Soak in concentrated H2So4 for 20 - 30 minutes(D)
- Types of seedling (2)

: Operational a. Potted seedling : Not examined b. Stump : Not examined c. Bare root

(3) Sowing month at Tiva Nursery : May

(4) Growing speed in the nursery : Quite fast

- 3 -

Note for watering : Avoid too much watering.

(6)Note for other things

Plantation 4

(1) Site condition

(2) Land Preparation : (i) In 1987, total clearing, but not cut down useful trees more than 5cm in

D.B.H.

(ii) In 1988, strip clearing, 1m width slashing and 2m width remaining, the

same as (i) for useful trees.

(3) Number of seedlings per ha : (i) In 1987, 1,000 seedlings/ha

planted.

(ii) In 1988 1,000 seedlings/ha planted.

(4) Size of planting hole

: (i) In 1987, 45cm x 45cm.

(ii) In 1988, 45cm x 45cm.

(5) Weeding

: Weeding is very important, at least 2 times per year, if

possible 3 times.

(6) Damage

: Young plants in the nursery and in plantations may be killed by

locusts and rats (I).

(7)Growing speed

(8) Management : Fast

: Possible of coppicing and pollarding(D). Direct seeding is advantageous because it is economical and there is no risk of damaging the quickly developing taproot by transplanting. Transplanting of wildlings cannot be recommended because of the

long roots(I).

(9) Some data from forestation site

Planted	Compart.	Area		Surviva	ıl rate		Не	eight
Year			Jul.89	Nov.89	Oct.90	Oct.91	Oct.90	Oct.91
		ha	%	%	%	%	cm	cm
87		1.11	_	_	-	_	-	-
88	I I -D	2.09	48.0	5.0	-	_	-	_

(10) Some data from extension

(11)Others

It is deep-rooted and does not compete with crops for surface moisture.(B)

Be careful water condition in plantation site.

This species is used for agroforestry. For agroforestry, 50-100 seedlings will be planted per ha(B).

(10)

Utilization

Species: Acacia auriculiformis Cf. A:, B:, C:142, D:14, 130, 156, E:, F:, G:34, H:-, I:-, 1 Basic data (1)Family name : Mimosaceae : -Vernacular name (2): Queensland, Australia (3)Origin (4)Climatic condition a. Preferred climatice type(B): No data Climate adaptability(D) Temperature Dry period Zone Prec. Dry months No. of DP Highest Lowest Mean Permanently >18 >1500 None humid Monosoonal, >18 1(short) >1500 <4 short dry season >18 Subhumid 600-1500 4 - 8Average annual rainfall, mm Note; Prec. Dry months: Total number of dry months (<50 mm) per year No of DP: Number of dry period per year Preferable ecological zone(H) : No data Environmental requirements(G) Temperature: Annual temperature range from 26 deg.C. to over 30 deg.C. : It is suitable for a forest plantation crop at altitudes Altitude up to about 600m. Precipation: Its natural habitat has an average annual rainfall varying 1,500 to 1,800 mm and a dry season of 6 months. Well adapted to drought. : It will grow in a wide range of deep or shallow soil Soil including sand dunes, mica schist, clay, limestone, podsoles, laterite, and lateric soil. There is a case that the trees grow on alkaline sand dunes (pH 9.0) as well as on acid soil (pH 3.0) from uranum mining. : No data Site requirements(I) Distribution in Kenya (5): Sandy soil, alkaline(pH >7.5) in Soil characteristics (6) reaction, seasonal water logging, well drained in drainage, shallowness (<50 cm)(A). : Shade intolerance. (7)Shade tolerance : 30m (C) Mature tree's height (8): 60cm (C) Mature tree's diameter (9)

: Industrial purposes, fuelwood/charcoal,

short fiber pulp(D)

ornamental, gum, tannin/dyes, wood-pulp, furniture, building poles, fence posts,

: Nitrogen-fixation (11) Others Seed Month of flowering (1)Month of collection (2): To go up a tree and take pods. Method of collection (3)Method of preparation (4)Method of storage (5)Number of seeds per pod : (6)Number of seeds per Kg. or 1.: 30,000 - 89,200 seeds/kg.(D). (7): 40 - 80%(D) Usual germination rate (8)Provenance (9): (10)Others 3 Seedling (1) Applied seed pretreatment: Soak in hot water for 12 hours, soak in concentrated H2So4 for 20 to 30 minutes or immerse in boiling water(D). Immerse seeds in boiling water and leaving them to cool and soak for 24 hours(G). Types of seedling (2): Operational a. Potted seedling : Not examined b. Stump : Not examined c. Bare root Sowing month at Tiva Nursery : April (3)Growing speed in the nursery : Fast growing : Avoid too much watering. Note for watering (5)Note for other things (6)Plantation 4 (1) Site condition : In 1988, strip clearing, 1m width in (2) Land Preparation slashing and 2m remaining, but not cut down useful trees more than 5 cm in D.B.H. Number of seedlings per ha : In 1988, 1,000 seedlings/ha (3): In 1988, 45cm x 45cm Size of planting hole (4): Weeding is very important, at least Weeding (5)2 times per year, if possible 3 times. (6)Damage : Fast growing (7)Growing speed : Coppicing(D) (8)Management Some data from forestation site (9)Survival rate Planted Compart. Areas Jul.89 Nov.89 Oct.90 Oct.91 Oct.90 Oct.91 Year % % % CM cmha 43.5 29.0 14.0 75 246 0.92 74.5 1988 I-F Some data from extention (10)(11)Others Because of its ability to grow on very poor soil, it has been intro-

2

and Nigeria(G). Easily established by direct seeding(G).

duced into countries such as Indonesia, Malaysia, India, Tanzania

Species: Acacia gerrardii

Cf. A:165, B:62, C:-, D:16, 157, E:124, F:- G:-, H:-, I:-

1 Basic data

- (1) Family name : Mimosaceae
- (2) Vernacular name : Muthii, Kithi(Kamba),
- (3) Origin : Indigenous
- (4) Climatic condition

	a.	Preferred	climatic	type	(B)	:
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a.	II CICITOR OILMOO	TO 00 F- (-)			
Zone	Climatic type	Prec.	Evap.	Temp.	Alt.
II, 3	0(1	1000-1600	1300-2100	20-22	1200-1800
II, 4-5	Limuru(part)	1000-1600	1300-2100	16-20	1500-2150
III, 3	Kisumu/				
	Murang'a(part)	800-1400	1450-2200	20-22	1200-1800
III, 4-5	Nairobi	800-1400	1450-2200	16-20	1500-2150
IV, 3	Lake Victoria				
10.000	/Thika(part)	600-1100	1550-2200	14-20	1500-2450
V, 3-4	Kajiado	450- 900	1650-2300	18-20	1200-1850
V. 5-6	Maralal/Naivasha	450- 900	1650-2300	14-18	1850-2450

Note; Prec. Average annual rain fall, mm

Evap. Average annual potential evaporation, mm

Temp. Mean annual temperature, (deg.C)

Alt. Altitude, m

- b. Climate adaptability(D) : No data
- c. Preferable ecological zone(H): No data
- d. Environmental requirements(G): No data
- e. Site requirements(I) : No data
- (5) Distribution in Kenya: Widely distributed in wooded grassland from 1,300 m to 2,100 m(A). The species

grows well in moist to swampy sites in riverine area(B). There are many trees

around Tiva Nursery.

- (6) Soil characteristics : Moist soil.
- (7) Shade tolerance
- (8) Mature tree's height
- (9) Mature tree's diameter
- (9) Mature tree's d

: 15m, occasionally shrubby(A).

: Fodder, medicine(D), fuelwood. The bark is used for the treatment of coughs and sore throat(E).

: Nitrogen-fixation

(11) Others

2 Seed

- (1) Month of flowering
- (2) Month of collection
- (3) Method of collection

: September in Kibwezi

: To collect pods under a tree, or fall them on the ground by rocking or hitting by pole then collect them.

: After dry pods, then put in to a sack (4) Method of preparation and hit by a pole. : Store in a cool, dry and insect-free Method of storage (5)place(B). (6)Number of seeds per pod Number of seeds per Kg. or 1.: (7)(8) Usual germination rate (9)Provenance : (10)Others Seedling Applied seed pretreatment: (1)(2)Types of seedling : Operational a. Potted seedling : Possible b. Stump : Not examined c. Bare root Sowing month at Tiva Nursery : February to April (3)Growing speed in the nursery : Fast (4): Be careful to much watering. Note for watering (5)(6)Note for other things Plantation Site condition (1): (i) In 1988, strip clearing, 1m width (2)Land Preparation slashing and 2m remaining, but not cut down useful trees more than 5cm in D.B.H. (ii) In 1989, strip clearing, 2m width slashing and 1m remaining, the same as in (i) for useful trees. : (i) In 1988, 1,000 seedlings/ha (3) Number of seedlings per ha planted. (ii) In 1989, 830 seedlings/ha planted. : (i) In 1988, 45cm x 45cm (4)Size of planting hole (ii) In 1989, 65cm x 65cm : Weeding is very important, at least 2 (5)Weeding times per year, if possible 3 times. (6) Damage They said that with adequate (7)Growing speed : Fast. ground water the tree is fast growing(B). : It has good agroforestry potential in (8) Management

3

4

its range(B).

31 - 2

Some da	ata from for	estati	on sit	e					
Plante	d Compart.	Areas		Sur	vival	rate		Height	5
Year			Jul.	Nov.	Oct.	Oct.	Oct.	Oct.	
			89	89	90	91	90	91	
		ha	%	%	%	%	cm	cm	
1988	I-F	1.42	85.0	77.0	43.5	39.0	34	34	
	I -H	2.42	87.0	79.5	71.5	68.0	66	81	
	I-J-3	2.60	87.0	-	47.5	34.0	27	30	
	I-P-2	0.40	85.0	-	43.8	35.6	34	36	
	II-J-2	1.01	83.5	47.5	62.0	53.5	45	49	
Sub-to	tal	7.85	(88.5)	(68.0)					
1989 Note:	DESCRIPTION OF THE PROPERTY OF		s 65cm	x 65c	100000000000000000000000000000000000000	0 84	.5	48	59
	Planted Year 1988 Sub-to-	Planted Compart. Year 1988 I-F	Planted Compart. Areas Year ha 1988 I-F 1.42 I-H 2.42 I-J-3 2.60 I-P-2 0.40 II-J-2 1.01 Sub-total 7.85 1989 B-1-3(L) 0.36	Planted Compart. Areas Year Jul. 89 ha % 1988 I-F 1.42 85.0 I-H 2.42 87.0 I-J-3 2.60 87.0 I-P-2 0.40 85.0 II-J-2 1.01 83.5 Sub-total 7.85 (88.5)	Year Jul. Nov. 89 89 89 ha % % 1988 I-F 1.42 85.0 77.0 I-H 2.42 87.0 79.5 I-J-3 2.60 87.0 - I-P-2 0.40 85.0 - II-J-2 1.01 83.5 47.5 Sub-total 7.85 (88.5)(68.0) 1989 B-1-3(L) 0.36	Planted Compart. Areas Survival Year Jul. Nov. Oct. 89 89 90 ha % % 1988 I-F 1.42 85.0 77.0 43.5 I-H 2.42 87.0 79.5 71.5 I-J-3 2.60 87.0 - 47.5 I-P-2 0.40 85.0 - 43.8 II-J-2 1.01 83.5 47.5 62.0 Sub-total 7.85 (88.5)(68.0) 92.	Planted Compart. Areas Survival rate Year Jul. Nov. Oct. Oct. Oct. 89 89 90 91 ha % % % 1988 I-F 1.42 85.0 77.0 43.5 39.0 I-H 2.42 87.0 79.5 71.5 68.0 I-J-3 2.60 87.0 - 47.5 34.0 I-P-2 0.40 85.0 - 43.8 35.6 II-J-2 1.01 83.5 47.5 62.0 53.5 Sub-total 7.85 (88.5)(68.0)	Planted Year Compart. Areas Survival rate Year Jul. Nov. Oct. Oct. Oct. Oct. Oct. Oct. 89 89 90 91 90 ha % % % cm 1988 I-F 1.42 85.0 77.0 43.5 39.0 34 I-H 2.42 87.0 79.5 71.5 68.0 66 I-J-3 2.60 87.0 - 47.5 34.0 27 I-P-2 0.40 85.0 - 43.8 35.6 34 II-J-2 1.01 83.5 47.5 62.0 53.5 45 Sub-total 7.85 (88.5)(68.0)	Planted Compart. Areas Survival rate Height Year Jul. Nov. Oct. Oct. Oct. Oct. Oct. Oct. Oct. Oct. Oct. Oct. Oct. Oct. Oct.

(10) Some data from extension

(11) Others

⁻ The farmers in the Kwa-vonza Location prefer this species as their family use for fuelwood and charcoal.

```
Species: Acacia holocericea
Cf. A:, B:, C:, D:16, 158, E:, F:, G:-, H:-, I:-
1
     Basic data
      (1)
          Family name
                             : Mimosaceae
      (2)
          Vernacular name
      (3)
          Origin
                             : Australia
      (4)
          Climatic condition
           a. Preferred climatic type(B): No data
               Climate adaptability(D) : No data
           c. Preferable ecological zone(H) : No data
           d. Environmental requirements(G) : No data
                                              : No data
               Site requirement(I)
           e.
          Distribution in Kenya
      (5)
      (6)
          Soil characteristics
          Shade tolerance
      (7)
      (8)
          Mature tree's height
          Mature tree's diamter
      (9)
                                   : Mulching, live fencing, ornamental,
     (10) Utilization
                                     wood-pulp, timber, fuelwood/charcoal
                                      fodder, food(fruits)(D).
     (11) Others
2
     Seed
      (1)
          Month of flowering
                                  : February in Kitui.
      (2)
          Month of collection
                                  : July in Kitui.
      (3)
          Method of collection
          Method of preparation
      (4)
                                  :
      (5)
          Method of storage
      (6)
           Number of seeds per kg. or 1.: 72,000 seeds/kg(D).
          Usual germination rate
      (7)
                                  :
      (8)
          Provenance
      (9)
          Others
3
      Seedling
      (1)
           Applied seed pretreatment:
      (2)
           Types of seedling
           a. Potted seedling
                                   : Operational
           b. Stump
                                   : Not examined
           c. Bare root
                                   : Not examined
          Sowing month at Tiva Nursery : January
      (3)
      (4) Growing speed in the nursery : Slow growing
      (5)
          Note for watering
                                   : Avoid too much watering.
      (6) Note for other things
```

4 Plantation

(1) (2)	Site condition Land Preparation : (i) In 1988, strip clearing, 1m width slashing and 2m remaining, but not cut down useful trees more than 5cm in D.B.H. (ii) In 1989, strip clearing, 2m width slashing and 1m remaining, the same as in (i) for useful trees.
(3)	Number of seedlings per ha: (i) In 1988, 1,000 seedlings/ha planted. (ii) In 1989, 830 seedlings/ha planted.
(4)	Size of planting hole : (i) In 1988, 45cm x 45cm
	(ii) In 1989, 65cm x 65cm.
(5)	Weeding : Weeding is very important, at least 2
	times per year, if possible 3 times.
(6)	Damage : Eaten by dik-diks.
(7)	Growing speed : Not so fast growing in the Pilit
	Forest.
(8)	Management :
(9)	Some data from forestation site
	Planted Compart. Areas Survival rate Height
	Year Jul.89 Nov.89 Oct.90 Oct.91 Oct.90 Oct.91
	ha % % % cm cm
	1988 I-G 0.68 22.0 4.0 0.5 - 60 -
	1989 B-I-2(L) 0.49 42.5 13.5 32 75
	Note: (L): Hole size is 65cm x 65cm
()	

- (10) Some data from extension(11) Others

Species: Acacia nilotica

Cf. A:159, B:64, C:- D:18, 131, 159, E:125, F:-, G:98, H:-, I:123

1 Basic data

(1) Family name : Mimosaceae

(2) Vernacular name : Musewa (Kamba), Mugungu (Swahili), Falcon's clow

acacia(English).

(3) Origin : Indigenous

(4) Climatic condition

a.	Preferred climatic	type(B) :			
Zone	Climatic type	Prec.	Evap.	Temp.	Alt.
III, 1	Kwale	800-1400	1450-2200	24 - 30	0- 900
III, 2-3	Kisumu/Murang'a	800-1400	1450-2200	20-24	900-1800
III, 4	Nairobi(part)	800-1400	1450-2200	18-20	1500-1850
IV, 1	Lamu	600-1100	1550-2200	24-30	0- 900
IV, 2-3	Lake Victoria/Thika	600-1100	1550-2200	20-24	900-1800
IV, 4	Rumuruti/Narok(part		1550-2200	18-20	1500-1850
V, 1-2	Taveta/Isiolo	450- 900	1650-2300	22-30	0-1200
V, 3-4	Kajiado	450- 900	1650-2300	18-22	1200-1850
VI, 1-2	Magadi/Garba Tula	300- 550	1900-2400	22-30	0-1200
Vi, 3-4	Kirimun	300- 550	1900-2400	18-20	1200-1850
VII, 1-2	Wajir	150- 350	2100-2500	22-30	0-1200
Distriction of the same of	•				

Note; Prec. Average annual rain fall, mm
Evap. Average annual potential evaporation, mm
Temp. Mean annual temperature, (deg.C)

Alt. Altitude, m

	b.	Climate	adaptability(D)	:
Zone		Prec.	Dry period	

Zone	Prec.	Dry pe	Te	Temperature			
		Dry months	No. of DP	Mean	Lowest	Highest	
Subhumid	600-1500	4-8	1		>18		
Semi-arid,							
warm to co	1d 250-600	8-10	1 or 2	<18			
Arid, hot							
desert	<250	11-12	1	>18			
Humid sub-							
tropics	<1200	-	None		-3 <t<18< td=""><td>>22</td></t<18<>	>22	
Temperate							
maritime	>1200	-	None		-3 <t<18< td=""><td>10-22</td></t<18<>	10-22	
	Noto: Drog	Arranad		1 - 2 - 1 1			

Note; Prec. Average annual rainfall, mm

Dry months: Total number of dry months (>50 mm) per year

No of DP: Number of dry period per year

c. Preferable ecological zone(H): No data

d. Environmental requirements(G):

Temperate : These trees withstand extremes in temperature, but are frost tender when young.

Altitude :The trees will grow at elevation up to 500 m in the Himalayas.

Rainfall : In general, the various subspecies can survive in very arid site, but thrive under irrigation.

:It grows on variety of soil, even poor ones. It Soil prefers alluvium, but grows well on heavy, black

cotton and clay soil as well.

This species grows with annual rainfalls Site requirements: between 250 and 1,000 mm and tolerates temperature of more than 50 deg.C, but no frost(I).

: Wildly distributed from 200 m to 1,800m, (5) Distribution in Kenya common near river banks(A).

: Loam in soil texture, neutral (6) Soil characteristics (pH 6.5 - 7.5) or alkaline(pH > 7.5) in reaction, well drained or seasonal water

logging in drainage (D).

: Young seedlings require full sun and (7) Shade tolerance frequent weeding(G). Careful weed control in plantations is necessary(I).

15m(B) to 20m(A). Mature tree's height (8)

Mature tree's diameter : (9)(10) Utilization

: Fuelwood/chacoal, fooder, tannin and gum, bee-forage, furniture, timber(D). bark is used for treatment of sore throat and coughs, the leave is used as a treatment for chest pains or pneumonia, root is used for treatment of indigestion or stomach trouble ETC(E).

The hard, taugh wood is resistant to termites, impervious to water(G). Roasted seed serve as spice. In some regions, young pods are eaten as a

vegetable.

: Nitrogen-fixation. Termite resistant and (11) Others

water repellant(B).

It has a flattish or umbrella-shaped crown and is easily identified by its bright-yellow, sweet-scented flower heads, its sweel-smelling gray or black pods, and paired whitish spines at the base of each leaf. There are several subspecies of this plant(G).

2 Seed

: February in Kaveta. Month of flowering (1)

: August or September in Kaveta. Month of collection (2)

: To collect pods under a tree, or fall Method of collection (3)them on the ground by rocking or hitting by pole then collect them.

: Put dried pods into a mortar and knock Method of prepatation (4)by a pestel, then sellect by wind.

: Sort and store as with other acacia(B). Method of storage (5)

Number of seeds per pod: (6)

Number of seeds per kg. or 1.: 7,000 - 11,000 seeds/kg.(D). (7)

Usual germination rate : 60 -90%(D) (8)

(9)Provenance (10) Others : It is often attacked in the pods by bruchid beetles and is sometimes difficult to clean(B).

3 Seedling

- (1) Applied seed pretreatment: Fresh seed needs no pretreatment but older seed should be soaked 24 hours or nicked(B). Immerse in boiling water, allow to cool, soak in cold/tepid water for 24 hours or soak in concentrated H2So4 for 5 15 minutes(D).
- (2) Types of seedling
 a. Potted seedling
 b. Stump
 c. Bare root
 : Operational
 : Possible
 : Not examine
- (3) Sowing month at Tiva Nursery : April to May
- (4) Growing speed in the nursery : Fast
- (5) Note for watering : Be careful to much watering.
- (6) Note for other things :

4 Plantation

- (1) Site condition
- (2) Land Preparation : (i) In 1988, strip clearing, 1m width slashing and 2m remaining, but not cut down useful trees more than 5cm in D.B.H.
 - (ii) In 1989, strip clearing, 2m width slashing and 1m remaining, the same as in (i) for useful trees.
- (3) Number of seedlings per ha : (i) In 1988, 1,000 seedlings/ha planted.
 - (ii) In 1989, 830 seedlings/haplanted.
- (4) Size of planting hole : (i) In 1988, 45cm x 45cm (ii) In 1989, 65cm x 65cm.
- (5) Weeding : Weeding is very important, at least 2 times per year, if possible 3 times.
- (6) Damage :
- (7) Growing speed : Rather fast growing.
- (8) Management : Lopping is applicable(D).
- Some data from forestation site (9)Planted Compart. Areas Survival rate Height Year Jul.89 Nov.89 Oct.90 Oct.91 Oct.90 Oct.91 % % % ha % CM 1988 I-L-20.27 89.0 76.7 74.4 69 68 1989 B-I-1(L) 0.7397.0 91.9 50 56 Note: (L): Hole size is 65cm x 65cm.
- (10) Some data from extension: The farmers in the Kwa-vonza location chose this species for their family
- use as fuelwood, medicine and shade.

 Direct sowing is possible but young plants do not compete well with grasses or weeds(B).

 Acacia nilotica belongs to the African

acacia which have been and still are the object of disagreement concerning their taxonomy, especially their classiffication into subspecies and varieties.

At present, 9 subspecies/varieties are recognized(I).

Widespread in tropical and subtropical Africa and Asia, extending as far eastwards as India. An exceedingly variable species in which 9 subspecies have been delimited, mainly on differences in the shape, size and degree of pubescence of pods. Most fruiting speciments can be placed quite readily, but some do create difficulties. Seven of the subspecies occur in Africa. (A conspectus of the African Acacia species; P 106; Ross, J.H. Oct. 1979 Botanical Research Institute, Republic of South Africa.)

```
Species: Acacia pendula
Cf. A:, B:, C:147, D:18, 131, 159, E:, F:, G:-, H:-, I:-
      Basic data
1
                               : Mimosaceae
           Family name
      (1)
           Vernacular name
      (2)
                               : Queensland, New South Wales, Australia.
           Origin
      (3)
           Climatic condition
      (4)
                                                  : No data.
               Preferred climatic type(B)
                Climate adaptability(D)
                                                             Temperature
                               Dry period
               Prec.
Zone
                                                                    Highest
                                                 Mean
                                                         Lowest
                         Dry months No. of DP
Semi-arid,
                                                  >18
                                     1 or 2
                           8-10
              250-600
  hot
Semi-arid,
  warm to
                                                  <18
                                     1 or 2
                           8-10
              250-600
  cold
Humid sub-
                                                                       <22
                                                           -3<t<18
              >1200
                                      None
  tropics
Temperate
                                                                       10 - 22
                                                           -3<T<18
                                      None
              >1200
  maritime
                               Average annual rainfall, mm
             Note; Prec.
                   Dry months: Total number of dry months (>50 mm) per year
                   No of DP: Number of dry period per year
                                                  : No data
                 Prefarable ecologizal zone(H)
                 Environmental requirements(G)
                                                  : No data
                 Site requirements(I):
                                        No data
             e.
       (5)
            Distribution in Kenya
                                      : Clay soil, alkaline(pH>7.5) in
            Soil characteristics
       (6)
                                        reaction(D)
       (7)
            Shade tolerance
       (8)
            Mature tree's height
            Mature tree's diameter
       (9)
                                      : Furniture, turnery, wheel spokes, fuel
            Utilization
      (10)
                                        wood, posts, fodder, converted timber,
                                        ornamental(D).
      (11)
            Others
 2
       Seed
            Month of flowering
       (1)
       (2)
            Month of collection
       (3)
            Method of collection
            Method of preparation
       (4)
       (5)
            Method storage
            Number of seeds per pod
       (6)
            Number of seeds per kg. or 1. : 43,000 - 48,000 seeds/kg(D).
       (7)
       (8)
            Usual germination rate
                                      : 45 - 80\%(D).
       (9)
            Provenance
      (10)
            Others
```

20

3 Seedling

(1) Applied seed pretreatment: Immerse in boiling water, allow to

cool(D).

(2) Types of seedling

a. Potted seedlingb. Stumpc. Bare rootc. Derationald. Not examinedexamined

(3) Sowing month at Tiva Nursery :(4) Growing speed in the nursery :

(5) Note for watering : Avoid too much watering.

(6) Note for other things :

4 Plantation

(1) Site condition :

(2) Land Preparation : In 1989, strip clearing, 2m width

slashing and 1m remaining but not cut down useful trees more

than 5 cm in D.B.H.

(3) Number of seedlings per ha : In 1989, 830 seedlings/ha.

(4) Size of planting hole : In 1989, 65cm x 65cm.

(5) Weeding : Weeding is very important, at least

2 times per year, if possible 3 times.

(6) Damage

(7) Growing speed : Slow

(8) Management

(9) Some data from forestation site

Planted	Compart	. Area	as Su	rviva	l rate		He	ight
Year	* ************************************		Jul.89 Nov.	89 No	v.90 Oc	t.91 No	v.90	Oct.91
		ha	%	%	%	%	cm	cm
1989	A - I - 7	0.32	(No.10426 5	?) -	58.3	37.1	21	19
	A-I-8	0.28	(No.11223)	-	39.6	0.7	26	10
	A-I-9	0.24	(No.11225)	_	18.3	5.0	17	5
Sub-tota	al	0.84						

Note: Hole size is 65cm x 65cm

- (10) Some data from extension
- (11) Others

Species: Acacia polyacantha

Cf. A:167, B:64, C:, D:14, 132, E:126, F:61, G:-, H:11, I:131

Basic data 1

: Mimosaceae Family name (1)

: Musewa, Kivovoa(Kamba) Mkengewa(swahili), (2)Vernacular name

Falcon's claw Acacia(English)

: Indigenous (3)Origin

Climatic condition (4)

sub-humid 500-1200

	a. Preferre	ed climatic	type(B):		
Zone	Climate type	Prec.	Evap.	Temp.	Alt.
II, 1	Ramisi	1000-1600	1300-2100	24-30	0- 900
II, 2-3		1000-1600	1300-2100	20-24	900-1800
III, 1	Kwale	800-1400	1450-2200	24-30	0- 900
	Kisumu/Murang'a	a 800-1400	1450-2200	20-24	900-1800
IV, 1	Lamu	600-1100	1450-2200	24-30	0- 900
IV, 2-3	Lake Victoria/				
	Thika	600-1100	1550-2200	18-20	1500-1850
V, 1-2	Taveta/Isiolo	450- 900	1650-2300	22-30	0-1200
V, 3-4	Kajiado	450- 900	1650-2300	18-22	1200-1850
VI, 12	Magadi/Garba				
	Tula	300- 550	1900-2400	22-30	0-1200
VI, 3-4	Kirimun	300- 550	1900-2400	18-22	1200-1850

Note; Prec. Average annual rain fall, mm

Evap. Average annual potential evaporation, mm

Temp. Mean annual temperature, (deg.C)

Alt. Altitude, m

b Zone	. Climate Prec.	adaptabilit Dry p	y(D) : period		Temper	rature
		Dry months	No. of DP	Mean	Lowest	Highest
Humid	600-1500	4-8	1		>18	
Semi-arid	250- 600	8-10	1 or 2	-		
Hihgland						

1

: Average annual rainfall, mm Note; Prec.

Dry months: Total number of dry months (<50 mm) per year

-3<t<18

>10

No of DP: Number of dry period per year

Preferable ecological zone(H):

2 - 6

Eco Zone Rainfall(mm) Altitude(m) Soil type Rotation TV 400-800 1,000-1,400 Sandy to sandy-clay Short soils to riverine clay/sandy soils

d. Environmental requirement(G): No data.

e. Site requirement(I): Prefers sites with a high ground water table. Generally salitary in the Sahel. Indicates entrophic and fresh soils, but occasionally also on stony slopes and compact soil.

: Widely distributed from 200m to (5) Distribution in Kenya 1,800m(A). : Common near river bank(A). Loam, acid, (6) Soil characteristics well drainaged and seasonal water logging(d) : Not tolerant to shade (7) Shade tolerance(8) Mature tree's height : 20m. (9) Mature tree's diameter : Useful for fuelwood/charcoal, fence (10) Utilization posts, tool handles and farm implements (A,B,D). Used for sore on the head or body of a young child. The roots are also used for treatment of the snake bite(E). : This species is dry area riverine acacia (11) Others which extends into swampy and moist areas in western Kenya.(B) Nitrogenfixation(D). Seed : January in Kaveta Month of flowering (1): June in Kaveta Month of collection (2): To collect pods under a tree, or fall (3) Method of collection them on the ground by rocking or hitting by pole then collect them. : After dry pod, then put them into a sack (4)Method of preparation and hit by pole. : Store in a cool, dry and insect-free Method of storage (5)place. Number of seeds per pod (6)Number of seeds per Kg. or 1. : 29,300 - 32,000 Seeds/Kg.(D) (7)Usual germination rate : 55 - 85%(D) (8) : (9) Provenance : Others (10)Seedling Applied seed pretreatment: Immerse in boiling water, stratify(D) Types of seedling (2): Operational a. Potted seedling : Possibleined b. Stump : Not examined c. Bare root

3

2

- Sowing month at Tiva Nursery : March to April
- Growing speed in the nursery : Fast (4)
- Note for watering : Avoid too much watering. (5)
- : Note for other things (6)

Plantation

- (1) Site condition
- (2) Land Preparation

: (i) In 1987, total clearing, but not cut down useful trees more than 5cm in D.B.H.

(3)	Number of seedlings pe	r ha	and 2m in (i) (iii) I and 2m for use : (i) In plante (ii) In plantee	n 1988, d. n 1989,	g, the ul tree 2m wid g, the s. 1,000 se	same as the slead of the slead	ashing as (i) gs/ha ngs/ha
(4)	Size of planting hole		(ii) In	n 1987, n 1988, n 1989, m	45cm x	45cm.	65cm.
(5)	Weeding	: Weed	ing is v	ery impo	ortant,	at lea	ast 2
(6)	Damage	· Some	s per ye	are atta	cked hv	bore.	.mcs.
(7)	Growing speed		fast.	are acca	oned 25		
(8)	Management	(2)		of copp	icing(D).	
(0)	. iditagement		- X-X	tural re			
(9)	Some data from foresta	0			F		
,	Planted Compart. Are			val rate		Не	ight
	Year			ct.90 Oc			
	h	a %	%	%	%	cm	cm
	1987 2.4	7 77.0		59.5	63.0	267	369
	2.9	3 44.5		34.0	32.0	234	191
	1.8	1 55.0		23.5	24.0	115	164
	Sub-total 7.2	1					
	W \$400855400 = 35 to 000 000						
	1988 I-J-1 3.5		3.0	-	-	_	9 5
	II-C 3.5		45.5	51.0	48.0	41	49
	II-F-3 2.7		54.6	12.0	=	35	-
	II-J-4 4.7		66.0	17.0	-	24	-
	Sub-total 14.6	U	(57.4)	(40.9)			
	1989 A-1-3(L) 0.8			97.5	94.5	72	101
	B-2-1(SW)0.3			95.5	80.5	38	40
	B-3-1(SW)0.2			82.3	60.4	35	19
	D-4-2(SW)0.3 E-2-5(L) 0.5			92.5	84.5	30	39
	F-4-1 0.0			79.0 60.9	44.0	36	61
	Sub-total 2.4			00.9	17.4	16	40
	Note (L): Hole size		65cm.				
	(SW): Spotweeding						

- (10) Some data from extension: This species is chosen for family use as fuelwood by farmers in the Kwa-vonza Location.
- (11) Others : Several varieties in different regions(I).

```
Species: Acacia salicina
Cf. A:, B:, C:147, D:19, 132, 160, E:-, F:-, G:-, H:-, I:-
1
      Basic data
          Family name
                            : Mimosaceae
      (2)
         Vernacular name
                            : Native willow(English).
      (3) Origin
                             : Australia
      (4) Climatic condition
                                            : No data
           a. Preferred climatic type(B)
               Climate adaptability(D)
                                                         Temperature
      Zone
                 Prec.
                             Dry period
                         Dry months
                                         No. of DP
                                                     Mean Lowest Highest
      Semi-arid,
                250-600
                                         1 or 2
       hot
                           8-10
                                                     >18
      Semi-arid,
        warm to
        cold
                250-600
                           8-10
                                         1 or 2
                                                     <18
                             Average annual rainfall, mm
            Note; Prec.
                 Dry months: Total number of dry months (<50 mm) per year
                 No of DP: Number of dry periods per year
               Preferable ecological zone(H):
                                               No data
               Environmental requirements(G):
                                               No data
               Site requirements(I): No data
          Distribution in Kenya
          Soil characteristics
                                   : Loam in soil texture(D)
      (6)
          Shade tolerance
      (7)
          Mature tree's height
      (9) Mature tree's diameter
                                   : Fodder, ornamental, fence posts,
     (10) Utilization
                                     fuel/charcoal(D).
                                   : Nitrogen-fixation(D).
     (11) Others
2
      Seed
           Month of flowering
      (1)
           Month of collection
      (2)
           Method of collection
      (3)
           Method of preparation
      (4)
           Method of storage
      (5)
           Number of seeds per pod :
           Number of seeds per kg. or 1. : 21,000 - 40,200 seeds/kg(D).
      (7)
           Usual germination rate
      (8)
      (9)
           Provenance
     (10)
           Others
3
      Seedling
```

(1) Applied seed pretreatment: Immerse in boiling water, allow to cool (D).

- (2) Types of seedling
 - a. Pot seedling : Operational
 b. Stump : Not examined
 c. Bare root : Not examined
- (3) Sowing month at Tiva Nursery :(4) Growing speed in the nursery :
- (5) Note for watering : Avoid too much watering.
- (6) Note for other things

4 Plantation

- (1) Site condition :
- (2) Land Preparation : In 1989, strip clearing, 2m width slashing and 1m remaining, but not cut down useful trees more than

5cm in D.B.H.

Height

- (3) Number of seedlings per ha : In 1989, 830 seedlings/ha
- (4) Size of planting hole : In 1989, 65cm x 65cm
- (5) Weeding : Weeding is very important, at least 2 times per year, if possible 3 times.
- (6) Damage :
- (7) Growing speed:
- (8) Management :
- (9) Some data from forestation site
 Planted Compart. Areas Survival rate

Year	•		Jul.89	Nov.89	Nov.90	Oct.91	Nov.90	Oct.91
		ha	%	%	%	%	cm	\mathbf{cm}
1989	A-1-1*(L)	0.27			28.0	12.9	15	17
	B-5-1**(L)				67.0	22.0	30	15
	, ,	0 70						

Total 0.76 Note *: Seed No. 15465, **: Seed No. 16293,

- (L): Hole size is $65 \, \text{cm} \times 65 \, \text{cm}$
- (10) Some data from extension
- (11) Others

Species: Acacia senegal

Cf. A:161, B:65, C:148, D:19, 160, E:126, F:-, G:102, H:11, 13, I:133

1 Basic data

: Mimosaceae Family name (1)

: Mung'ole(kamba), Kikwata(Swahili), Sudan gum (2)Vernacular name arabic, Three-thorned acacia(English)

: Indigenous (3)Origin

(4)Climatic condition

Zo	ne Climatic type	Prec.	Evap.	Temp.	Alt.
VI, 1	Lamu	600-1100	1550-2200	24-30	0- 900
IV, 2-3	Lake Victoria/Thika	600-1100	1550-2200	20-24	900-1800
V, 1-2	Taveta/Isiolo	450- 900	1650-2300	22-30	0-1200
	Kajiado(part)	450- 900	1650-2300	20-22	1200-1800
V, 3	najiado(part)	400 300	1000 2000		0 4000

V, 3 Kajiado(part) 0-1200 22-30 1900-2400 300- 550 VI, 1-2 Magadi/Garba Tula 1200-1800 1900-2400 20 - 22300- 550 VI, 3 Kirimun(part) 22 - 300 - 12002100-2500 150- 350 VII, 1-2 Wajir

Average annual rain fall, mm Note; Prec.

a. Preferred climatic type(B):

Average annual potential evaporation, mm Evap.

Mean annual temperature, (deg.C) Temp.

Alt. Altitude, m

: No data Climate adaptability(D)

c. Pr	eferable ecolog		D-tation
Eco.Zone	Rainfall(mm)	Altitude(m)	Soil type Rotation
IV	400-800	1,000-1,400	Sandy to sandy-clay Short soils to riverine 15-25yrs
			clay/sandy soils
$V_{-}VT$	Under 400	1.000-1.400	Sandy clay to sandy Short

loam soils

Environmental requirements(G): Temperature : Average temperatures are between 14 deg.C and 43 deg.C in Sudan.

:It grows from 100 m to 1,700 m in East Africa. Altitude :It can grow under subdesert conditions when annual Rainfall rainfall is as low as 200 mm, with 8 - 11 dry months in the year, but prefers 300 - 400 mm.

:The tree will grow naturally in sand; it also grows in Soil clay, except where the rainfall is high enough to cause water-logging(800 mm or more).

Site requirements(I): No data

- : Widespread in dry grassland in Northern Distribution in Kenya (5)Province, Machakos and Kajiado(A).
- Soil characteristics
- : The seedlings need weeding for the Shade tolerance (7)first 2 years(G). It is necessary to weed more years in Pilot Forest.
- : Shrub or to 12 m(A). Mature tree's height (8)
- Mature tree's diamter (9)

: Industrial purposes, fuelwood/charcoal, (10) Utilization live fencing(D), gum arabic (high quality one used as a good stabilizer, glue, starch used for clothing and other industrial applications (B), or a valuable additive used in beer, confectionery, pharmaceuticals and other industries(A)). : Shrub or to 12 m(A). Mature tree's height (9)Mature tree's diameter (10): This species is drought-resistant, (11) Others valuable in dryland agroforestry and for erosion control(A). Nitrogen-fixation It is often the only species to survive in dry areas. This species is ideal for reclamation of refractory site and sifting sand dunes(G). Seed Month of flowering (1): February and July in Tiva, Kitui. Month of collection (2): To stand on the lader or something (3) Method of collection like that, then drow the branch carefully by stick with a hook and take pods. : After dry pods, then put them into a (4) Method of preparation sack and hit by pole. (5)Method of storage Number of seeds per pod (6)Number of seeds per kg. or 1.: 10,200 - 33,000 seeds/kg.(D) (7)Usual germination rate (8)Provenance (9): (10)Others : Seedling (1) Applied seed pretreatment: Soak concentrated H2So4 for 20 - 30 minutes, soak cold/tepid water for 36 hours(D). Overnight soaking is effective(G). (2)Types of seedling a. Pot seedling : Operational b. Stump : Not examined c. Bare root : Not examined (3)Sowing month at Tiva Nursery : May Growing speed in the nursery : (4)Note for watering : Avoid too much watering. (5)

4 Plantation

(6)

2

3

(1) Site condition

(2) Land Preparation

Note for other things

: In 1988, strip clearing, 1m width slashing and 2m remaining,

but not cut down useful trees more than 5cm in D.B.H.

- (3) Number of seedlings per ha : In 1988, 1,000 seedlings/ha planted.
- (4) Size of planting hole : In 1988, 45cm x 45cm
- (5) Weeding : Weeding is very important, at least 2 times per year, if possible 3 times.
- (6) Damage
- (7) Growing speed : Slow.
- (8) Management : Coppicing(G).
- (9)Some data from forestation site Planted Compart. Areas Survival rate Height Year Jul.89 Nov.89 Oct.90 Nov.91 Oct.90 Oct.91 ha % % % % CM CI 1988 51.5 I - F0.65 90.5 46.0 24 20 67.0 II-J-31.00 78.5 78.0 47.0 36.0 19 16 Sub-total 1.65
- (10) Some data from extension: The farmers in Kwa-vonza Location like this species as fuelwood.
- (11) Others

 : Young trees require protection from grazing animals as they are highly palatable(B).

 Typical tree of the Sahel from Senegal to the Red Sea, varieties occurring in East and South Africa.

Species: Acacia tortilis

Cf. A:169, B:67, D:19, 132, 160, E:-, F:-, G:106, H:11, 13, I:145

Basic data 1

: Mimosaceae (1) Family name

(2) Vernacular name : Mulaqa, kilaa (Kamba), Mgunga(Swahili),

Umbrella thorn(English)(A,B).

: Indigenous (3) Origin

(4) Climatic condition

	a. Preferred clin	natic type()	в) :_	Mamn	Alt.
Zone	Climatic type	Prec.	Evap.	Temp.	0- 900
	Kwale	800-1400	1450-2200	24-30	
III, 1		800-1400	1450-2200	20-24	900-1800
111, 2-3	Kisumu/Murang'a	3개 및 및	1550-2200	24-30	0- 900
IV, 1	Lamu	600-1100		771X	900-1800
IV, 2-3	Lake Victoria/Thika	600-1100	1550-2200	20-24	8.8
97 14 14 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Rumuruti/Narok(part)	600-1100	1550-2200	18-20	1500-1850
IV, 4		450- 900	1650-2300	22-30	0-1200
V, 1-2	Taveta/Isiolo			18-22	1200-1850
V, 3-4	Kajiado	450- 900	1650-2300		0-1200
VI, 1-2	Magadi/Garba Tula	300- 550	1900-2400	22-30	
Section 5 Name 2007	Kirimun	300- 550	1900-2400	18-22	1200-1850
VI, 3-4			2100-2500	22-30	0 - 1200
VII, 1-2	Wajir	150- 350	2100-2000	25 00	

Note; Prec. Average annual rain fall, mm

Average annual potential evaporation, mm Evap.

Mean annual temperature, (deg.C) Temp.

Alt. Altitude, m

b. Zone	Climate Frec.	adaptabilit Dry p Dry months	eriod	Me an	Temperatur Lowest	e Highest
Semi-arid	050 600	8-10	1 or 2	>18		
hot Semi-arid,	250-600	8-10	1 OF 2.	/10		
warm to						
cold	250-600	8-10	1 or 2	<18		
Arid, hot	.050	11 10	1	>18		
desert	<250	11-12	1	710		
Humid sub-	×1000		None		-3 <t<< td=""><td>>22</td></t<<>	>22
tropics	>1200	_	None		0.0713	144
Temperate			**		2/4/10	7. 00
maritime	>1200	•	None		-3 <t<18< td=""><td>16 22</td></t<18<>	16 22

Note; Prec. Average annual rainfall, mm

Dry months: Total number of dry months (<50 mm) per year

No of DP: Number of dry periods per year

	c.	Preferable eco	ological zone(н):	
Eco.Zone		Rainfall(mm)	Altitude(m)	Soil type	Rotation
ΙV		400-800	1,000-1,400	Sandy to sandy-clay	Short
				soils to riverine	
		320 N		clay/sandy soils	
V-VI		Under 400	1,000-1,400	Sandy clay to sandy	Short
				loam soils	

d. Environmental requirements(G):

Temperature: This species grows well in hot, arid climates with maximum temperatures as high as 50 deg.C. Plants less than 2 years old are easily damaged by frost and

require protection.

Altitude : This species is best adapted to the lowlands. Rainfall : This species thrives where rainfall is up to

1,000mm.

Soil : The tree favours alkaline soils. It grows fairly well in shallow soil, less than 0.25 m deep, though

it develops long lateral roots that can become a nuisance in nearby fields, paths, and roadway.

e. Site requirements(I): Forms open, pure stands on glacis, on blownout eroded sites, skeleton soils, latoritic gravel, etc. Frequently on "sal fellugineux tropical plants".

Prospers well on deep alkaline soil, on sandy loam, occasionally also on fossil dunes. Intolerant of inundations.

(5) Distribution in Kenya

: Very widely distributed up to 1,800 m in woodland, grassland and semi-desert areas; conspicuous in Northern Province, often along rivers, also found in Nairobi National Park(A).

(6) Soil Characteristics

: Sand or loam in soil texture,
Alkaline(pH > 7.5) or neutral (pH 6.5 7.5) in reaction, well drained soil(D).
It prefers alkaline soil and tolerates

(7) Shade tolerance

(8) Mature tree's height

(9) Mature tree's diameter

(10) Utilization

_-,

: 20 m(A), 4 - 15 m(G).

shallow, rocky types(B).

: Fuelwood/charcoal, fodder, tannin/dyes, live fencing, timber, bee-forage, ornamental, soil conservation(D).

: Nitrogen-fixation(D), almost always evergreen(A). Sometimes with several trunks that spray upwards and outwards, fountain-like, that support a flat-topped umbrella of feathery foliage(G). Its thorns are a distinguishing feature; there are two kinds - long, straight, and white, and small, brownish and hooked(G). There are four distinct sub-species in different ecological zones, in East Africa.(G). However, according to "A Conspectus of the African Acacia species" (Ross. J.H. 1979) there are 6 sub-species in Kenya.

(11) Others

2 Seed

- (1) Month of flowering :
- (2) Month of collection : August in Bura
- (3) Method of collection : To collect pods under a tree, or fall them on the ground by rocking or hitting by pole then collect them.
- (4) Method of preparation : After dry pods, then put them into a sack and hit by pole.
- (5) Method of storage : Under normal conditions the seeds can be stored for a long time but must be protected against insects(I).
- (6) Number of seeds per pod :
- (7) Number of seeds per Kg. or 1. : 12,000 16,000 seeds/kg.(D). 15,000 - 20,000 seeds/kg.(I).
- (8) Usual germination rate :
- (9) Provenance :
- (10) Others :

3 Seedling

- (1) Applied seed pretreatment: Strictly, soak in cold/tipid water for 24 hours, acid treatment(D).

 The seeds are dipped in hot water and soaked overnight to ensure quick and uniform germination. Seeds can also be treated with concentrated H2So4(G).
- (2) Types of seedling
 - a. Pot seedlingb. Stumpc. Operationald. Possible
 - c. Bare root : Not examined
- (3) Sowing month at Tiva Nursery : February
- (4) Growing speed in the nursery : Fast
- (5) Note for watering : Avoid too much watering.
- (6) Note for other things :

4 Plantation

- (1) Site condition
- (2) Land Preparation

- : (i) In 1986, total clearing, but not cut down useful trees more than 5cm in D.B.H.
 - (ii) In 1987, total clearing, the same as in (i) for useful trees. (iii) In 1988, strip clearing, 1m width slashing and 2m remaining, the same as in (i) for useful trees.
 - (iv) In 1989, strip clearing, 2m width slashing and 1m remaining, the same as in (i) for useful
- (3) Number of seedlings per ha : (i) In
 - : (i) In 1986, 1,000 seedlings/ha
 - (ii) In 1987, 1,000 seedlings/haplanted.

		(iii) In 1988, 1,000 seedlings/ha
		planted.
		(iv) In 1989, 830 seedlings/ha
		planted.
(4)	Size of planting hole	: (i) In 1986, 45cm x 45cm.
	•	(ii) In 1987, 45cm x 45cm.
		(iii) In 1988, 45cm x 45cm.
		(iv) In 1989, 65cm x 65cm.
(5)	Weeding : :	Seedlings require initial weeding to
		facilitate faster growth(G). Very
		important, at least 2 times per year,
		if possible 3 times.
(6)	Damage :	Trees are susceptible to attack by
		caterpillars, beetles, and blight
	3	diseases that infest other Mimosaceae
		in an area. Wild herbivores graze new
		shoots and young seedlings(G).
(7)	Growing speed :	If well managed it grows relatively
		fast on dry sandy soil(B).
(8)		Coppicing, lopping, pollarding(D).
(9)	Some data from forestation	site Survival rate Height
	Planted Compart. Areas	Dul vivai i acc
		.89 Nov.89 Oct.90 Oct.91 Oct.90 Oct.91
	ha	% % % Cm Cm
	1986 0.15	
	1987 0.52	4.0 68.5 38.5 37.4 26 22
	1988 I-P-2 1.85 5	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
	1989 C-1-6(L) 0.60	71.0 10.0
	Note (L): Hole size is 65	сш х оэсш

- (10) Some data from extension: The farmers in Kwa-vonza Location chose this species for their family use as charcoal, fodder, fuelwood, pole and fencing.
- (11) Others

Species: Acacia xanthophloea

Cf. A:169, B:, D:20, 160, E:-, F:-, G:-, H:7, I:-,

1 Basic data

- : Mimosaceae (1)Family name
- : Fever tree, Naivasha thorn(English) (2) Vernacular name
- : Indigenous (3) Origin
- (4) Climatic condition
 - Preferred climatic type(B): No data
 - Climate adaptability(D) : No data
 - Prefarable ecological zone(H): C.

Rotation Soil type Altitude(m) Rainfall(mm) Eco.Zone Riparian soil Medium 1,000-2,000 III-Highland 800-1,400

- Environmental requirement(G): No data d.
- Site requirements(I): No data
- : Gregarious in high ground water areas (5) Distribution in Kenya beside lakes or rivers from 600 to 2,000 m, often in black cotton soil, now widely planted in and around Nairobi(A).
- Soil characteristics (6)
- Shade tolerance (7)
- Mature tree's height : 25 m(A)(8)
- Mature tree's diameter (9)
- : Posts, Fuelwood/Charcoal, fodder, bee-(10) Utilization forage, ornamental(D)
- : Nitrogen-fixation (11) Others

Older trees become brittle, and being shallow rooted in soft ground tend to fall or drop large branches in high

winds(A)

2 Seed

- Month of flowering (1)
- Month of collection (2)
- (3) Method of collectio
- Method of preparation (4)
- Method of storage (5)
- (6)Number of seeds per pod
- Number of seeds per Kg. or 1.: (7)
- (8)Usual germinal rate : 30%(D)
- (9)Provenance
- (10)Others

3 Seedling

- Aplied seed pretreatment:
- (2)Types of seedling
 - a. Pot seedling : Operational

:

b. Stump : Not examined : Not examined

(3) Sowing month at Tiva Nursery : May(4) Growing speed in the nursery : Fast

(5) Note for watering : Avoid too much watering.

(6) Note for other things:

4 Plantation

(1) (2)	Site condition Land Preparation	:	(i) In 1987, total clearing, but not cut down useful trees more than 5cm in D.B.H. (ii) In 1988, 1m width slashing and 2m remaining, the same as in (i) for useful trees. (iii) In 1989, 2m width slashing and 1m
(3)	Number of seedlings per	ha	remaining, the same as in (i) for useful trees. a: (i) In 1988, 1,000 seedlings/ha planted. (ii) In 1988, 1,000 seedlings/ha planted. (iii) In 1989, 830 seedlings/ha
(4)	Size of planting hole	:	planted. (i) In 1987, 45cm x 45cm. (ii) In 1988, 45cm x 45cm. (iii) In 1989, 65cm x 65cm.
(5)	Weeding	:	Weeding is very important, at least 2 times per year, if possible 3 times.
(6) (7) (8) (9)	Damage Growing speed Management Some data from forestation	: on	: Very fast growing. site Survival rate Height

- Survival rate Height Compart. Areas Planted Oct. Oct. Oct. Nov. Oct. Jul. Year 91 91 90 90 89 89 cm % cm % % % ha 1.98 1987 3.50 5.48 Sub-total 97 75 36.0 45.0 37.5 76.0 3.57 1988 II-H-2 67 68.0 43.8 57 0.41 1989 C-1-5(L) Note (L): Hole size is 65cm x 65cm
- (10) Some data from extension
- (11) Others

Species: Acrocarpus fraxinifolius

Cf. A:49, B:68, C:-, D:21, 142, 161, E:-, F:-, G:-, H:-, I:-

Basic data 1

: Mimosaceae Family name (1)

Vernacular name : Indian ash, shinle tree(English) (2)

: India, South East Asia (3)Origin

Climatic condition (4)

a. Preferred climatic type(B):

	alimatic type	Prec.	Evap.	Temp.	Alt.
Zone	Climatic type		1200- 200	18-22	1200-1850
I, 3-4	Kakamega	1100-1700	100	PERSONAL DISCUSSION	
I, 5	Kericho(part)	1100-1700	1200- 200	16 - 18	1850-2150
		1000-1600	1300-2100	20-22	1200-1800
	Migori(part)				1500-2150
II, 4-5	Limuru(part)	1000-1600	1300-2100		NAME OF TAXABLE PARTY OF TAXABLE PARTY OF TAXABLE PARTY.
	isumu/Murang'a(part)	800-1400	1450-2200	20-22	1200-1800
			1450-2200	16-20	1500-2150
III, $4-5$	Nairobi	800-1400	1450-2200	10-20	1000 2100

Note; Prec. Average annual rain fall, mm

Average annual potential evaporation, mm Evap.

Mean annual temperature, (deg.C) Temp.

Altitude, m Alt.

b. Climate adaptability(D) :

7000	Prec.	Dry ner	ry period			Temperature	
Zone			No. of DP	Mean	Lowest	Highest	
Monsoonal, short dry season Humid sub-tropic	>1500	<4_	1(short) None		>18 -3 <t<18< td=""><td>>22</td></t<18<>	>22	
Temperate maritime	>1200	-	None		-3 <t<18< td=""><td>10-22</td></t<18<>	10-22	
Highland sub-hum summer rainfa	mid 11 500-1200) 2-6	1		-3 <t<18< td=""><td>>11</td></t<18<>	>11	

Note; Prec. Average annual rainfall, mm

Dry months: Total number of dry months (<50 mm) per year

No of DP: Number of dry periods per year

: Month

Preferable ecological zone(H) : No data : No data Environmental requirement(G) : No data Site requirements(I)

- : Originally introduced in coffee and tea (5) Distribution in Kenya plantations as a shade tree and now widely planted around Nairobi and in better rainfall areas at medium altitudes(A).

(6) Soil characteristics : Loamy soil, neutral, (6.5 - 7.5) in reaction, well drained in drainage(D).

(7)Shade tolerance

(8) Mature tree's height : 60m in dense forest or 50m in open setting(B).

(9)Mature tree's diamter (10) Utilization : Fuelwood/charcoal, shade and shelter, ornamental, light construction, furniture, boxes, fence posts, beeforage(D). (11) Others : A clean, straight trunks and bright red young foliage(A), nitrogen-fixation. Seed (1)Month of flowering (2)Month of collection : July to September(B). March in Kaveta. (3) Method of collection : To collect pods, or fall them on the ground by rocking or hitting by pole then collect, or go up to a tree and take pods. (4)Method of preparation : After dry pods, then put them into a sack and hit by pole. (5)Method of storage : The seeds store well for long periods in cool dry places(B). Number of seeds per pod (7)Number of seeds per Kg. or 1. : 28,950 - 50,000 seeds/Kg.(D) (8) : 70 - 100%(D). Usual germination rate (9) Provenance : (10) Others : Seedling (1)Applied seed pretreatment: None pretreatment, immerse in boiling water, allow to cool(D) (2)Types of seedling a. Pot seedling : Operational b. Stump : Not examined c. Bare root : Not examined (3)Sowing month at Tiva Nursery : April to June (4)Growing speed in the nursery : Fast (5)Note for watering : Avoid too much watering. (6)Note for other things Plantation (1)Site condition (2): In 1989, strip clearing 2m width Land Preparation slashing and 1m remaining, but not cut down useful trees more than 5cm in D.B.H. : In 1989, 830 seedlings/ha planted (3)Number of seedlings per ha : In 1989, 65cm x 65cm (4)Size of planting hole : Weeding is very important, at least (5)Weeding 2 times per year. (6)Damage (7)Growing speed (8): Fast growing Management

2

3

- (9) Some data from forestation site
 Planted Compart. Areas Survival rate
 Planted Compart. Areas Survival rate
 Flanted Comp
- (10) Some data from extension
- (11) Others

```
Species: Albizia amara
Cf. A:173, B:, D:133, 162, E:-, F:-, G:-, H:-, I:-
1
      Basic data
      (1)
           Family name
                               : Mimosaceae
      (2)
           Vernacular name
                              : Bitter albizia(English)
      (3)
                               : Indigenous
           Origin
      (4)
           Climatic condition
            a. Preferred climatic type(B)
                                                 : No data
                Climate adaptability(D)
      Zone
              Prec.
                        Dry period
                                                   Temperature
                        Dry months No. of DP
                                                 Mean Coldest
                                                                    Hottest
  Sub-humid 600-1500
                           4 - 8
                                          1
                                                        >18
            Note; Prec.
                               Average annual rainfall, mm
                  Dry months: Total number of dry months (<50 mm) per year
                  No of DP: Number of dry periods per year
                Preferable ecological zone (H) : No data
                Environmental requirement(G)
                                                 : No data
                Site requirements(I)
                                                 : No data
                                     : Widely distributed in wooded grassland
      (5) Distribution in Kenya
                                       and lower to medium altitudes, also
                                       indigenous in India, Sri Lanka, and much
                                       of Eastern and Central Africa(A).
                                     : Loam or sand in soil texture, neutral
      (6) Soil characteristics
                                       (pH 6.5 - 7.5) in reaction, well drained
                                       soil, shallowness, salinity(D).
           Shade tolerance
      (7)
           Mature tree's height
                                     : 10 m but often smaller(A).
      (8)
      (9)
           Mature tree's diameter
     (10) Utilization
                                     : Timber, carvings, fuelwood, fodder,
                                       wood-tool/utensils, cosmetic/hygenic(D).
     (11) Others
                                     : Nitrogen-fixation.
2
      Seed
           Month of flowering
      (2)
           Month of collection
           Method of collection
      (3)
           Method of preparation
      (4)
      (5)
           Method of storage
           Number of seeds per pod :
      (6)
           Number of seeds per Kg. or 1. :
      (7)
           Usual germination rate
      (8)
      (9)
           Provenance
                                     :
     (10)
           Others
                                     :
3
      Seedling
      (1) Applied seed pretreatment:
```

- (2) Types of seedling
 a. Pot seedling
 b. Stump
 : Operational
 : Not examined
 - c. Bare root : Not examined
- (3) Sowing month at Tiva Nursery :(4) Growing speed in the nursery : Slow.
- (5) Note for watering : Avoid too much watering.
- (6) Note for other things

4 Plantation

(1) Site condition : (2) Land Preparation : In 1989, strip clearing, 2m width slashing and 1m remaining, but not cut

down useful trees more than 5cm in D.B.H.

- (3) Number of seedlings per ha : In 1989, 830 seedlings/ha planted.
- (4) Size of planting hole : In 1989, 65cm x 65cm.
- (5) Weeding : Weeding is very important, at least 2 times per year.
- (6) Damage :(7) Growing speed :
- (8) Management : Coppicing, lopping and pollarding are available(D).
- Some data from forestation site (9)Survival rate Height Planted Compart. Areas Jul. 89 Nov. 89 Nov. 90 Oct. 91 Nov. 90 Oct. 91 Year ha % % % % CM CM 1989 D-1-2(L) 0.93 93.5 75.0 23 27

Note (L): Hole is 65cm x 65cm.

- (10) Some data from extension
- (11) Others

(6)

```
Species: Albizia anthelmintica
Cf. A:, B:, C:, D:162, F:66, 67, G:-, H:-, I:-
1
      Basic data
      (1)
           Family name
                             : Mimosaceae
                             : Muguta(Kikuyu)(F), Kuoa, Muoa, Muowa(Kamba)(E)
      (2)
           Vernacular name
      (3)
           Origin
                              : Indigenous
      (4)
           Climatic condition
                                               : No data
            a.
                Preferred climatic type(B)
                                                : No data
                Climate adaptability(D)
            b.
                Preferable ecological zone(H) : No data
            C.
                Environmental requirements(G) : No data
            d.
                                                : No data
                Site requirements(I)
            e.
           Distribution in Kenya : A common shrub of the dry bushland(F).
      (5)
      (6)
           Soil characteristcs
      (7)
           Shade tolerance
           Mature tree's height
                                    : 8 m(F).
      (8)
           Mature tree's diameter
      (9)
                                    : Fodder, medicine(D). Decoction of bark
           Utilization
      (8)
                                      or root used as an anthemlmintic mainly
                                      for tapeworm, and as a purgative (Correct
                                      dossage is essential). It is also used
                                       for treating malaria (E).
                                    : Nitrogen-fixation
     (11) Others
2
     Seed
                                   : August in Tiva
           Month of flowering
      (1)
                                    : October in Tiva
           Month of collection
      (2)
                                   : To go up to tree and take pods.
          Method of collection
      (3)
                                   : After dry pods, then put them into a
          Method of preparation
      (4)
                                      sack and hit by a pole.
          Method of storage
      (5)
          Number of seeds per pod :
      (6)
          Number of seeds per Kg. or 1. :
      (7)
          Usual germination rate
                                   :
      (8)
          Provenance
      (9)
                                     :
          Others
     (10)
3
     Seedling
          Applied seed pretreatment:
      (1)
          Types of seedling
      (2)
                                     : Operational
          a. Pot seedling
                                    : Not examined
          b. Stump
                                    : Not examined
          c. Bare root
          Sowing month at Tiva Nursery :
      (3)
          Growing speed in the nursery : Slow
      (4)
                               : Avoid too much watering.
          Note for watering
      (5)
          Note for other things
```

4 Plantation

- (1) Site condition
 (2) Land Preparation
 : In 1989, strip clearing 2m width slashing and 1m remaining, but not cut down useful trees more than 5cm in D.B.H.
- (3) Number of seedlings per ha : In 1989, 830 seedlings/ha planted.
- (4) Size of planting hole : In 1989, 65cm x 65cm
- (5) Weeding : Weeding is very important, at least 2 times per year.
- (6) Damage
- (7) Growing speed
- (8) Management
- Some data from forestation site (9)Survival rate Planted Compart. Areas Jul.89 Nov.89 Nov.90 Oct.91 Nov.90 Oct.91 Year % CI % % % CM ha 66.5 15 19 81.0 0.99 1989 D-1-4(L)Note (L): Hole size is 65cm x 65 cm.
- (10) Some data from extension
- (11) Others

Species: Azadirachta indica

Cf. A:143, B:73, C:250, D:28, 135, 167, E:-, F:-, G:114, H: 9, 11, I:173

1 Basic data

(1) Family name : Meliaceae

(2) Vernacular name : Mkilifi, Mwarubaini(Swahili),

Neem tree(English)

(3) Origin : India, Sri-Lanka, Burma

(4) Climatic condition

a. Preferred climatic type(B) :

Zone	Climatic type	Prec.	Evap.	Temp.	Alt.
III, 1	Kwale	800-1400	1450-2200	24-30	0- 900
III, 2-3	Kisumu/Murang'a	800-1400	1450-2200	20-24	900-1800
IV, 1	Lamu	600-1100	1550-2200	24-30	0- 900
IV, 2-3	Lake Victoria/Thika	600-1100	1550-2200	20-24	900-1800
V, 1-2	Taveta/Isiolo	450- 900	1650-2300	22-30	0-1200
V, 3	Kajiado(part)	450- 900	1650-2300	20-22	1200-1800
VI, 1-2	Magadi/Garba Tula	300- 550	1900-2400	22-30	0-1200
VI, 3	Kirimun(part)	300- 550	1900-2400	20-22	1200-1800

Note; Prec. : Average annual rainfall, mm

Evap. : Average annual potential evaporation, mm

Evap. : Mean annual temperature, (deg.C)

Alt. : Altitude, M

b. Climate adaptability(D) :

Zone	Prec.	Dry period		Temperature		ė
		Dry months	No. of DP	Mean	Lowest	Highest
Sub-humid	600-1500	4-8	1		>18	1119 - 1110 900 900 000 000 000
Semi-arid, hot	259- 600	8-10	1 or 2	>18		
Semi-arid,						
warm to cold	250- 600	8-10	1 or 2	<18		
Arid, hot						
desert	<250	11-12	1	>18		

Note; Prec. Average annual rainfall, mm

Dry months: Total number of dry months (<50 mm) per year

No of DP: Number of dry period per year

M : Months

c. Preferable ecological zone(H):

Eco-Zone	Rainfall(mm)	Altitude(m)	Soil type	Rotation
III (Low- land)	800-1,400	0-1,400	Sandy to sandy-loam	Short
IV	400-800	0-1,400	Sandy to sandy-clay	Short
			soils to riverine cla	у/

d. Environmental requirements(G) :

Temperature: This species survives in great heat, even shade

temperature up to 45 deg. C.

Altitude : It will grow at altitudes from 50 m to 1,500 m.

Rainfall: This species is most successful in arid tropical and sub-tropical zones having a mean average annual rainfall of 450-1,150 mm. It is useful even where the rainfall is less than 500 mm, for it can tolerate long dry seasons.

Soil

: The tree is undemanding and grows well on most soils, including dry, stony, clay and shallow soils. The optimum pH is 6.2 or above, although the tree will grow well at pH 5.

e. Site requirements:

Very drought resistant, heat resistant but sensitive to cold. No particular site requirements; tolerates slight salinity. Grows better than other species on dry, stony and shallow, and nutrient-deficient soils without ground water contact. Optimum pH 6.2. Suitable for the improve ment of degraded, nutrient-poor soils. Generally deep-rooted, means also has lateral roots that may extend radically to 15m. Intolerant to frequent inudation and lateritic out crops.

- (5) Distribution in Kenya
- : Widely planted at the coast for fueld, timber and shade, and increasingly used in agroforestry in exhausted soil(A).
- (6) Soil characteristics
- : Sandy soil, Alkaline(pH >7.5), neutral (6.5 7.5) in reaction, well drained in drainage(D).
- (7) Shade tolerance
- : Shade intolerant.
- (8) Mature tree's height
- Weeds do no affect growth(I).
- (9) Mature tree's diameter
- : 18 m(A).

(10) Utilization

: Fuelwood/charcoal, medicinal, industrial timber, poles, fodder, gum, shade/ ornamental, building poles, fence posts, insect repellent, green manure, tannin, live fencing, bee-forage, food-fruits, essential oil, cosmetic/hygine, timber(D).

Leaves, with a protein content of 15%, could be used as fodder for camels, sheep and goats. The seed cake is said to be toxic to sheep and other livestock(I).

(11) Others sto

: This species is a deep-rooted mediumsized tree, usually evergreen, except in periods of extreme drought(G).

2 Seed

- (1) Month of flowering
- (2) Month of collection
- (3) Method of collection
- (4) Method of preparation
- : February to March in Kibweg.
- : The fruit pulp must be removed and the seed drier before transportation(B).

Method of storage : Viability is very short lasting, a (5)maximum of two months(B). Intermediate storage in moist sand(I). (6) Number of seeds per fruit: Number of seeds per Kg. or 1.: 4,400 - 6,300 seeds/kg.(D). (7)1,600 - 1,700 seeds/kg.(I). (8) Usual germination rate : 35 - 65%(D)(9) Provenance (10)Others : Only swollen seeds should be used(I). Seedling (1)Applied seed pretreatment: None pretreatment. (2) Types of seedling a. Pot seedling : Operational b. Stump : Not examined c. Bare root : Not examined (3)Sowing month at Tiva Nursery : February to March Growing speed in the nursery : Slow in Tiva (4)(5)Note for watering : Avoid too much watering. Note for other things : Seedlings ought to be 30-50 cm high(I). (6)Plantation (1)Site condition (2)Land Preparation : (i) In 1986, total clearing, but not cut down useful trees more than 5cm in D.B.H . (ii) In 1987, total clearing, the same as in (i) for useful trees. (iii) In 1988, strip clearing, 1m widhth slashing and 2m remaining, the same as in (i) for useful trees. : (i) In 1986, 1,000 seedlings/ha (3) Number of seedlings per ha planted. (ii) In 1987, 1,000 seedlings/ha planted. (iii) In 1988, 1,000 seedlings/ha planted. (4) Size of planting hole : (i) In 1986, 45cm x 45cm (ii) In 1987, 45cm x 45cm (iii) In 1988, 45cm x 45cm : Weeding is very important. (5) Weeding species is intolerant to grass competition and needs thorough weeding, especially in dry areas(G). : Imperfectly drained soils taproots (6) Damage tends to rot and the trees gradually die off(G). (7) Growing speed : Fast growing(G), but slow growing in the pilot forest. : Coppicing, lopping and pollading are

3

(8)

Management

available(D).

- Some data from forestation site Height Survival rate Compert. Areas Planted Jul.89 Nov.89 Oct.90 Oct.91 Oct.90 Oct.91 Year % CM % % % ha 0.22 1986 0.24 1987 12 10 28.5 44.4 57.0 0.76 1988 I-L-1
- Some data from extension (10)
- (11)Others

In West Africa, coppicing is usually done on an 8 years rotation, with the original spacing between the plantation trees most commonly 2.4m x 2.4m. In Ghana, fast rotation yield was 103 - 137 m3 of fuelwood per Ha(G).

Direct seeding is possible as well as propagation by cutting(I). This species is primarily suited for single tree plantation within compounds, villages, etc., along roadsides, canals, markets, and on fields with agricultural crops.

Species: Balanites aegyptiaca

Cf. A:27, B:74, C:239, D:28, 135, 168, E:43, F:-, G:-, H:11, I:(179)

1 Basic data

(1) Family name : Balanitaceae

(2) Vernacular name : Mjunju(Swahili), Mulului(Kamba),

desert date(English).

(3) Origin : Indigenous

(4) Climatic condition

	a. Preferred cli	matic type(B) :		-
Zone	Climatic type	Prec.	Evap.	Temp.	Alt.
III,1	Kwale	800-1400	1450-2200	24-30	0- 900
	Kisumu/Murang'a	800-1400	1450-2200	20-24	900-1800
III, 4-5		800-1400	1450-2200	16-20	1500-2150
IV, 1	Lamu	600-1100	1550-2200	24-30	0- 900
IV, 2-3	Lake Victoria/Thika	600-1100	1550-2200	20-24	0-1800
IV, 4-5	Rumuruti/Narok(part)	600-1100	1550-2200	16-20	1500-2150
V, 1-2	Taveta/Isiolo	450- 900	1650-2300	22-30	0-1200
V, 3-4	Kajiado	450- 900	1650-2300	18-22	1200-1850
V, 5	Maralal/				
	Naivasha(part)	450- 900	1650-2300	16-18	1850-2150
VI, 1-2	Magadi/Garba Tula	300- 550	1900-2400	24-30	0-1200
VI, 3-4	Kirimun	300- 550	1900-2400	18-22	1200-2150
VII, 1-2		150- 350	2100-2500	22-30	0-1200

Note; Prec. : Average annual rain fall, mm

Evap. : Average annual potential evaporation, mm

Temp. : Mean annual temperature, (deg.C)

Alt. : Altitude, m

b. Climate adaptability(D) :

D. C.	limate auc	aptability (D)					
Zone	Prec.	Dr	y period		Temperature		
		Dry months	No. of DP	Mean	Lowest	Highest	
		5.1X*10000001,0000001,0000001					
Subhumid	600-1500	4-8	1		>18		
Semi-arid	250- 600	8-10	1 or 2				
	<250	11-12	1	>18			
Arid, hot desert			1		-3 <t<18< td=""><td>>10</td></t<18<>	>10	
Highland subhumid	500-1200	2-6	1		0/0/10	710	

Note; Prec. Average annual rainfall, mm

Dry months: Total number of dry months (<50 mm) per year

No of DP: Number of dry periods per year

M: Month

c. Preferable ecological zone (H):
Eco-Zone Rainfall(mm) Altitude(m) Soil type Rotation
IV 400-800 500-1,400 Sandy to sandy-clay soils Short
to riverine clay/sandy
soils.

d. Environmental requirements(G) : No data.

e. Site requirement: Ecologically a very flexible species. Due to its deep tap root and thick bark it is very drought-

resistant and not damaged by grass fire. Grows on very different soils with annual rainfalls between 200 and 800 mm. Usually found mixed with Acacia seval, A. tortilis and other species (e.g. Sclerocarya birrea) but also forming almost pure stand(I).

- (5) Distribution in Kenya
- : Distributed savanna grassland from sea level to 2,000 m, often in sandy or black-cotton soil(A).
- (6) Soil characteristics
- : Heavy, loam and sand soil texture, alkaline (pH>7.5), neutral(pH:6.5 -7.5) in reaction, seasonal water logging well drained in drainage, Salinity(D). High grass competes for light and thus impedes regeneration(I).
- Shade tolerance (7)
- (8) Mature tree's height
- Mature tree's diameter (9)
- (10) Utilization

- : 6 m or occasionally 12 m(A).
- : A stem diameter of 30 cm.
- : Fuelwood/charcoal, timber, medicinal, poles, fodder, food(oil, fat, fruit), live fencing, pesticide, mulching(D). Roots used for abdominal pains, as purgative, and as an anthelmintic. Molten gum from the wood is mixed with maize meal porridge and eaten to treat chest complaints(E).

Wood carving, farm tools. The bark is used as a fish poison, and the fruit, although harmless to man and warmblooded mammals, produces a potent emulsion which kills both the freshwater snails that carry bilharzia and the water-fleas that carry guinea-worm

disease(A).

(11) Others

: Evergreen tree.

This tree is greatly valued in the driest areas of Kenya both for its fruit and its uses for stick(A). Wood is heavy and termite resistant(A). Seedlings are intensively browsed by all herbivores(I).

Seed

- Month of flowering (1)
- Month of collection (2)
 - : February in Tika, Kitui
- Method of collection (3)
- (4)Method of preparation
- (5) Method of storage
- : The seed stores well for up to one year, if the outer fruit is removed and kept clean and dry, away from insect attack(B).
- (6)Number of seeds per fruit:
- (7)Number of seeds per Kg. or 1.: 1,000 seeds/Kg.(D).
- (8)Usual germination rate :

(9) Provenance : (10)Others 3 Seedling (1) Applied seed pretreatment: Seeds should be soaked in hot water for 12 to 18 hours or scarified to overcome dormancy(I). (2)Types of seedling a. Pot seedling : Operational b. Stump : Not examined c. Bare root : Not examined (3)Sowing month at Tiva Nursery : May Growing speed in the nursery : Slow growing (4)(5)Note for watering : Be careful to much watering. Note for other things (6): Reproduction mainly by direct seeding but also by root suckers and cuttings(I). 4 Plantation Site condition (1)(2) Land Preparation : (i) In 1987, total clearing, but not cut down useful trees more than 5cm in D.B.H (ii) In 1988, 1m width slashing and 2m remaining, the same as in (i) for useful trees. (3)Number of seedlings per ha : (i) In 1987, 1,000 seedlings/ha planted. (ii) In 1988, 1,000 seedlings/ha planted. (4)Size of planting hole : (i) In 1987, 45cm x 45cm (ii) In 1988, 45cm x 45cm (5)Weeding : Weeding is very important, at least 2 times per year. (6)Damage (7)Growing speed (8)Management : Coppicing, lopping and pollarding are applicable(D). Some data from forestation site (9)Compart. Areas Planted Survival rate Height Year Jul.89 Nov.89 Oct.90 Oct.91 Oct.90 Oct.91 ha % % % CM 1987 1.47 2.27 0.72 Sub-total 4.91 1988 I-P-1 4.17 41.0 3.5 Some data from extension (10)The farmers in the Kwa-vonza location seem to be supplied by this species with fruits, fodder, fuelwood, charcoal and

timber.

Others

(11)

Species: <u>Cassia siamea</u>

Cf. A:57, B:78, C:162, D:35, 136, 178, E:-, F:-, G:120, H:9, I:221

Basic data 1

Highland sub-

humid

- : Caesalpinaceae (1) Family name
- (2) Vernacular name : -
- : Sounth-east Asia, India and Sri Lanka(B). (3) Origin
- (4) Climatic condition

a.	Preferred climatic	type(B):			
	Climatic type	Prec.	Evap.	Temp.	Alt.
	Ramisi	1000-1600	1300-2100	24 - 30	0- 900
II, 1		1000-1600	1300-2100	20-24	900-1800
11, 2-3	Migori		1450-2200	24-30	0- 900
III, 1	Kwale	800-1400		20-24	900-1800
III, $2-3$	Kisumu/Murang'a	800-1400	1450-2200		
IV, 1	Lamu	600-1100	1550-2200	24 - 30	0- 900
IV. 2-3	Lake Victoria/Thika	600-1100	1550-2200	20-24	900-1800
	Taveta/Isiolo	450- 900	1650-2300	22-30	0-1200
100 100 100 100		450- 900	1650-2300	20-22	1200-1800
V. 3	Kajiado	400 000	1000 0000		

Average annual rain fall, mm Note; Prec.

Average annual potential evaporation, mm Evap.

Mean annual temperature, (deg.C) Temp.

Alt. Altitude, m

500-1200 2-6

b.	Climate a	adaptabilit	y(D) :					
Zone	Prec.	Dry period			Tempera	Temperature		
		Dry months	No. of DP	Mean	Lowest	Highest		
Subhumid	600-1500	4-8	1		>18			
Semi-arid, hot	250- 600	8-10	1 or 2	>18				
Humid sub-								
tropics	>1200	-	None		-3 <t<18< td=""><td>>22</td></t<18<>	>22		
Temperate								
maritime	>1200	-	None		-3 <t<18< td=""><td>10-22</td></t<18<>	10-22		

Note; Prec. Average annual rainfall, m Dry months: Total number of dry months (<50 mm) per year

1

-3<t<18

>10

No of DP: Number of dry period per year

Preferable ecological zone (H):

Rainfall(mm) Altitude(m) Soil type Eco-Zone Rotation III, (Lowland 800-1,4000-1,400 Sandy to sandy-loam Short

Environmental requirements(G):

Temperature: This species cannot withstand cold but thrives in

tropical heat.

Altitude : It is generally lowland species. Rainfall: This species grows in a wide range of climates:
humid, sub-humid, dry, and arid. However, it is
most prevalent in monsoonal areas where annual rainfall is 1,000 mm or more and dry season lasts 4 or
5 months. In drier area (those with 500 - 700 mm
annual rainfall), the tree will grow after its second
or third year only if its roots have access to deep
soil moisture.

Soil : The tree grows best in deep, well-drained, relatively rich soils. It can tolerate soils containing luterite and limestone, provided drainage is not impaired.

- e. Site requirement(I): Prospers with 1,000 1,500 mm of annual rainfall but grows also with barely 500 mm. Tolerates even extended drought, however in the Sahel only with sufficient soil water supplies and in the southern most part if the roots have access to deep soil moisture. Requires deep soil which are sufficiently fresh, not too poor, not skeleton.
- (5) Distribution in Kenya : This species is commonly found in Kenya(B).
- (6) Soil characteristics : Loam or sund in soil texture, acid(pH < 6.5) or neutral(6.5 7.5) in reaction, well drained(D).
- (7) Shade tolerance : Weak in shade
- (8) Mature tree's height : 15 m(G).
- (9) Mature tree's diameter
- (11) Others

 : The tree is fairly resistant to termite(G).

 Suitable for shelterbelt plantation but not as shade tree in agroforestry project (root competition)(I). This species is more resistant than Cassia spectabilis in draught.

2 Seed

- (1) Month of flowering : January in Kitui region
- (2) Month of collection : September up to October in Tiva, Kibwege.
- (3) Method of collection : To go up to a tree and take pods.
- (4) Method of preparation : After dry pods, then put them into a sack and hit by a pole.
- (5) Method of storage

 : Seeds store for up to one year, but germination percentage steadily decreases during the course of the year(B).
- (6) Number of seeds per pod
- (7) Number of seeds per Kg. or 1.: 30,000 45,000 seeds/Kg.(D).

- : 50 85%(D)Usual germination rate (8)
- (9) Provenance

: Under normal conditions, seeds remain (10) Others

viable for 2 - 3 years(I).

3 Seedling

(1) Applied seed pretreatment: No pretreatment if seeds are fresh. soak in concentrated H2So4 for 5 - 15 minutes, or in cold/tepid water for

48 hours, immerse in boiling water,

allow to cool(D).

- (2) Types of seedling
 - a. Pot seedling

: Operational

b. Stump

: Stumps are available

: Not examined c. Bare root

- (3)Sowing month at Tiva Nursery : January to March
- (4)Growing speed in the nursery : Slow

(5)Note for watering : Avoid too much watering.

(6) Note for other things

: Young plants are very fire-sensitive; various parasites may damage the root

system(I).

4 Plantation

(1)Site condition

(2) Land Preparation

: (i) In 1986, total clearing, but not cut down useful trees more than 5cm in

D.B.H.

(ii) In 1987, total clearing, the same

as in (i) for useful trees.

(iii) In 1988, strip clearing, 1m width slashing and 2m remaining, the same as

in (i) for useful trees.

(iv) In 1989, strip clearing, 2m width slashing and 1m remaining, the same as

in (i) for useful trees.

(3)Number of seedlings per ha : (i) In 1986, 1,000 seedlings/ha

planted.

(ii) In 1987, 1,000 seedlings/ha

planted.

(iii) In 1988, 1,000 seedlings/ha

planted.

(iv) In 1989, 830 seedlings/ha

planted.

(4) Size of planting hole

: (i) In 1986, 45cm x 45cm.

(ii) In 1987, 45cm x 45cm.

(iii) In 1988, 45cm x 45cm.

(5)Weeding (iv) In 1989, partly 65cm x 65cm.

: Weeding is necessary for the first year or second(G). Weeding is needed for long in Pilot Forest.

(6)	Damage	: The trees are susceptible to attack b	у
		scale insects(B). The young trees	
		are browsed by livestock and wildlife	9
		and must be protected(G).	

(7) Growing speed(8) Management(7) Fast in suitable soil condition.(8) Coppicing and lopping are available(D).

(9) Some data from forestation site

Planted	Compart.	Areas		Surv	ival r	ate	Heig	ht
year			Jul.	Nov.	Oct.	Oct.	Oct.	Oct.
			89	89	90	91	90	91
		ha	%	%	%	%	cm	cm
1986		0.59						
		1.91						
Sub-tota	ıl	2.60						
1987		2.75						
1988	I-E-3	1.94	67.0	20.0	14.0	-	34	-
1	I-H-5	2.49	82.2	77.0	76.0	73.5	79	124
Sub-tota	al	4.43						
1989	B-2-2	0.49			95.5	52.5	46	63
	C-1-4(L)	0.49			96.0	79.0	52	80
Sub-tota	ıl	0.98						

Note (L): Hole size is 65cm x 65cm.

(10) Some data from extension

(11) Others

Plantation can be established by direct seedlings(G).

```
Card No.19
Species: Cassia spectabilis
Cf. A:57, B:-, C:-, D:35, 178, E:-, F:-, G:-, H:-, I:-
      Basic data
1
                               : Caesalpinaceae
           Family name
      (1)
                              : Mwenu(Kikuyu)
           Vernacular name
      (2)
                                : Tropical America
      (3)
           Origin
           Climatic condition
      (4)
                Preferred climatic type(B): No data
                 Climate adaptability(D) : No data
                 Preferable ecological zone (H) : No data
             C.
                 Environmental requirement(G)
                                                   : No data
             d.
                 Site requirements(I): No data
                                      : Widely planted up to 2,000 m in
      (5)
           Distribution in Kenya
                                         Kenya(A).
                                      : Flourishing even in poor or black-
      (6)
           Soil characteristics
                                         cotton soil, but not at its best if
                                         site is too dry(A). Indeed in suitable
                                         moisture and fertile soil this tree
                                         grows well.
       (7)
            Shade tolerance
            Mature tree's height
                                      : 10 m.
       (8)
            Mature tree's diameter
       (9)
            Utilization
                                       : Fuelwood, windbreaks, ornament(D).
      (10)
      (11)
           Others
2
       Seed
       (1)
            Month of flowering
                                      : April in Kitui region.
       (2)
            Month of collection
                                      : October in Tiva, Kitui District.
           Method of collection : To go up to a tree and take pods.

Method of preparation : After drying pods for 3 or 4 days then
       (3)
       (4)
                                        take out seeds using a knife from pod
                                         and dry for 2 or 3 days.
       (5)
            Method of storage
                                      : Keep in tin with charcoal, cotton sack
                                         (dardk room or) a well heated place.
       (6)
            Number of seeds per pod :
       (7)
            Number of seeds per Kg. or 1.: 31,000 - 35,000 seeds/kg.
```

3 Seedling

(8)

(9)

(10)

(1) Applied seed pretreatment: None, soak in hot water for 12 hours.(D)

: 15 - 50%

:

Types of seedling (2)

Provenance

Others

Usual germination rate

a. Seedling : Pot seedling

b. Stump : Stump is available

c. Bare root : Not examined

Sowing month at Tiva Nursery : February to March.

- (4) Growing speed in the nursery : Fast
- (5) Note for watering : Avoid too much watering.
- (6) Note for other things :

4 Plantation

- (1) Site condition
- (2) Land Preparation :
 - : (i) In 1986, total clearing, but not cut down useful trees more than 5cm in D.B.H.
 - (ii) In 1987, total clearing, the same as in (i) for useful trees. (iii) In 1988, strip clearing, 1m width slashing and 2m remaining, the same as in (i) for useful trees.
 - (iv) In 1989, strip clearing, 2m width slashing and 1m remaining, the same as in (i) for useful trees.
- (3) Number of seedlings per ha
- : (i) In 1986, 1,000 seedlings/ha
 - planted.
- : (ii) In 1987, 1,000 seedlings/ha planted.
 - (iii) In 1988, 1,000 seedlings/ha planted.
 - (iv) In 1989, 830 seedlings/ha
 - planted.
- (4) Size of planting hole : (i) In 1986, 45cm x 45cm.

:

- (ii) In 1987, 45cm x 45cm.(iii) In 1988, 45cm x 45cm.
- (iv) In 1989, partly 65cm x 65cm.
- (5) Weeding : Weeding is important, 2 times per year.
- (6) Damage : The trees are easily damaged by diebuck.
- (7) Growing speed : Very fast.
- (8) Management
- (9) Some data from forestation site

Some data from forestation site								
Planted	d Compart.	Areas	3	Surv	ival r	ate		Height
year			Jul.	Nov.	Oct.	Oct.	Oct.	Oct.
			89	90	90	91	90	91
		ha	%	%	%	%	CM	CM
1986		1.68						
1987		0.90						
		1.28						
Sub-to	tal	2.18						
1988	I-N	3.21	86.0	68.0	69.5	65.0	78	120
	II-E-1	1.75	40.4	41.5	48.0	55.0	66	75
	II-G-1	4.93	93.5	71.0	59.5	88.0	68	93
Sub-to	tal	9.89	(73.3)	(60.2)				
1989	A-1-2(L)	0.74			93.5	91.0	55	78
	B-3-2(SW)	0.20			97.2	93.4	34	51
	D-4-3(SW)	0.18			92.1	59.5	52	66
	E-2-4(L)	0.27			99.4	96.4	85	97
	F-4-2(S)	0.09			95.2	73.8	29	32
Sub-to		1.48						

- Note (L): Hole size is $65\,\mathrm{cm}$ x $65\,\mathrm{cm}$, (SW): Spotweeding, (S): Hole size is $25\,\mathrm{cm}$ x $25\,\mathrm{cm}$.
- (10) Some data from extension
- (11) Others

Species: <u>Casuarina equisetifolia</u>

Cf. A:69, B:79, C:18, D:36, 137, 179, E:-, F:-, G:38, H:9, I:227

1 Basic data

V, 1-2

V, 3-4

- (1) Family name : Casuarinaceae
- (2) Vernacular name : Mvinje(swahili), Whistling pine(English)
- (3) Origin : Indigenous (There is some debate about its indigenous status as it could very well have been brought from India centuries ago(B.)

(4) Climatic condition

1 - 1	madic condition				
a.	Preferred climatic	type(B):			
Zone	Climatic type	Prec.	Evap.	Temp.	Alt.
II, 1	Ramisi	1000-1600	1300-2100	24-30	0- 900
11, 2-3	Migori	1000-1600	1300-2100	18-20	1500 - 1850
II, 4	Limuru(part)	1000-1600	1300-2100	18-20	1500-1850
III, 1	Kwale	800-1400	1450-2200	24-30	0- 900
III, 2-3	Kisumu/Murang'a	800-1400	1450-2200	20-24	900-1800
III, 4	Nairobi(part)	800-1400	1450-2200	18-20	1500-1850
IV, 1	Lamu	600-1100	1550-2200	24-30	0- 900
IV, 2-3	Lake Victoria/Thika	600-1100	1550-2200	20-24	900-1800
IV, 4	Rumuruti/Narok(part)	600-1100	1550-2200	18-20	1550-1800
				55 (A)	

Note; Prec. Average annual rain fall, mm

Taveta/Isiolo 450- 900 Kajiado 450- 900

Evap. Average annual potential evaporation, mm

1650-2300

1650-2300

22 - 30

18 - 22

0 - 1200

1200-1850

Temp. Mean annual temperature, (deg.C)

Alt. Altitude, m

b. Climate adaptability(D) :

			,				
Zone	Prec.	Dry period			Temperature		
		Dry months	No. of DP	Mean	Lowest	Hightst	
Subhumid	600-1500	4-8	1		>18		
Semi-arid, h	ot 250-600	11-12	1 or 2	>18			
Semi-arid w	arm						
to cold	250- 600	11-12	1 or 2	<18			
Humid sub-							
tropics	>1200	-	None		-3 <t<18< td=""><td>>22</td></t<18<>	>22	
Temperate							
maritime	>1200	-	None		-3 <t<18< td=""><td>10-22</td></t<18<>	10-22	
Highland							
subhumid	500-1200	2-6	1		-3 <t<18< td=""><td>>10</td></t<18<>	>10	
	Note; Prec.		annual rainfa	50			
	Dry mont	hs: Total nu	mber of dry n	months	(<50 mm)	per year	

c. Preferable ecological zone (H):

Eco-Zone Rainfall(mm) Altitude(m) Soil type Rotation III-Low-land 800-1,400 0-1,400 Sandy soils Short(4 6 years)

No of DP: Number of dry period per year

d. Environmental requirements(G):

Temperature: The monthly mean maximum temperature in its native area is 10 - 33 deg. C, but it is adapted to a wide range of temperature.

: This is a lowland tree that can be planted from sea Altitude

level up to 1,500 m.

: In its natural habitat, annual rainfall is from 700 -Rainfall 2,000 mm, often with a dry season of 6 - 8 months.

However, it has been planted successfully in area with annual rainfall as little as 200 - 300 mm or

as much as 5,000 mm.

: The species tolerates calcareous and slightly saline Soil soil, but it grows poorly on heavy soil such as

clays.

Site requirement(I): The species grows well on deep sandy soil, tolerates, calcareous and slightly saline site. In its natural habitat annual rainfallvaries between 700 and 2,000 mm. Plantations in other parts of the world have been successfully established with as little as 200-300mm if ground water is available

(not deeper than 3 - 4m).

Distribution in Kenya (5)

: Coastal area, but this species has done surprisingly well at higher elevations including Nairobi(B).

Soil characteristics (6)

: Sand or loam in soil texture, alkaline (pH > 7.5), seasonal water logging or well drained in drainage, Salinity(D).

(7)Shade tolerance : Shade intolerant Young trees are especially resistant to competition from grass or plants for light(I).

- (8) Mature tree's height
- (9)Mature tree's diameter

Utilization (10)

: 20 M

: Fuelwood, charcoal, industrial timber, small timber/poles, fodder, shade/ ornamental, posts(G).

(11) Others

: Nitrogen-fixation.

This species has root nodules containing nitrogen-fixing actinomycete microorganisms(G).

Seedlings raised in nurseries may be planted bare-rooted, but ectomycorrhizae significantly enhance the adaptability of the trees and their ability to grow in newly established plantation and on marginal sites. Thus, transplanging in polythene bags with inoculated soil with Frankia actinomycete is recommended for afforestation(I).

2 Seed

- Month of flowering (1)Month of collection (2)
- (3)Method of collection
- (4)Method of preparation
- (5)Method of storage : Seeds may be stored over two years at low temperatures (-7 to 3 deg.C and
 - low humidity, less than 15%)(I).
- Number of seeds per fruit: (6)
- Number of seeds per Kg. or 1. : 200,000 1,000,000 seeds/kg.(D) (7)
- (8) Usual germination rate : 30 - 70%(D)
- (9) Provenance
- (10)Others

3 Seedling

- Applied seed pretreatment: None pretreatment
- (2)Types of seedling
 - a. Pot seedling : Operational : Not examined b. Stump c. Bare root : Not examined
- Sowing month at Tiva Nursery : December to June
- Growing speed in the nursery : Slow (4)
- (5)Note for watering : Be careful to much watering.

:

(6)Note for other things : When seeds are planted outside their natural range, the soil may need inoculating with clashed nodules from natural stand(G).

4 Plantation

- (1) Site condition
- (2) Land Preparation : (i) In 1986, total clearing, but not cut down useful trees more than 5cm in

(ii) In 1988, strip clearing, 1m width slashing and 2m remaining, the same as in (i) for useful trees.

- (iii) In 1989, strip clearing, 2m width slashing and 1m remaining, the same as in (i) for useful trees.
- (3) Number of seedlings per ha
- : (i) In 1986, 1,000 seedlings/ha planted.
 - (ii) In 1988, 1,000 seedlings/ha
 - planted. (iii) In 1989, 830 seedlings/ha
- planted. (4) Size of planting hole : (i) In 1986, 45cm x 45cm.
 - (ii) In 1988, 45cm x 45cm. (iii) In 1989, 65cm x 65cm.
- : Initially very important especially in (5)Weeding
 - dense grass cover(G).
- : The species is susceptible to root (6)Damage
 - rot(G).
- (7)Growing speed

(8) Management

1 - /									
(9)	Some data	from for	estat	ion sit	e				
	Planted	Compart.	Area	S	Survi	val rat	:e	F	leight
	year	_		Jul.89	Nov.89	Oct.90	Oct.91	Oct.90	Oct.91
	J		ha	%	%	%	%	cm	cm
	1986		1.28						
	1988	I-G	0.25	40.0	10.0	-	_	-	-
	1989	C-1-3(L	0.31			35.5	j -	66	~

Note (L): Hole size is 65cm x 65cm

- (10) Some data from extension
- (11) Others

In dry site, irrigation may be needed immediately after transplanting and as long as the first 3 years(G).

Species: Croton megalocarpus

Cf. A:101, B:83, C:-, D:41, E:89, F:126, G:-, H:5, 7, 11, I:-

1 Basic data

(1) Family name : Euphorbiaceae

(2) Vernacular name : Mukinduri(KIkuyu), Lameanguet(Swambur),

Muthulu(Kamba)

(3) Origin : Indigenous

(4) Climatic condition

1 1) CITMACIC CONDICTION				
	a. Preferred clim	matic type(E	3) :		
Zone	Climatic type	Prec.	Evap.	Temp.	Alt.
I, 3-4	Kakamega	1100-1700	1200-2000	18-22	1200-1850
I, 5-6	Kericho	1100-1700	1200-2000	14-18	1850-2450
II, 3	Migori(part)	1000-1600	1300-2100	20-22	1200-1800
II, 4-6	Limuru	1000-1600	1300-2100	14-20	1500-2450
III, 3	Kisumu/Murang'a(part)	800-1400	1450-2200	20-22	1200-1800
III, 4-5	Nairobi	800-1400	1450-2200	16-20	1150-2150
III, 6	Eldoret	800-1400	1450-2200	14-16	2150-2450
IV, 3	Lake Victoria/			2. 10	2100 2100
	Thika(part)	600-1100	1150-2200	20-22	1200-1800
IV, 4	Rumuruti/Isiolo(part)	600-1100	1150-2200	18-20	1500-1850

Note; Prec. Average annual rain fall, mm

Evap. Average annual potential evaporation, mm

Temp. Mean annual temperature, (deg.C)

Alt. Altitude, m

b. Climate adaptability(D) : No data

c. Preferable ecological zone (H):

Eco-Zone	Rainfall(mm)	Altitude(m)	Soil type	Rotation
II	Over 11,400		Variable deep red to	Short to
			loamy sandy soils	Medium
III-Highland	800 - 1,400	1,000 - 2,000	Sandy to sandy-clay	Short to
			soils to riverine	Medium
	920200		sandy/clay soils. (15-25 yrs)
IV	400 - 800	1,000 - 2,000	Sandy to sandy clay	Short to
			soils to riverine	medium
			sandy/clay soils	

- d. Environmental requirements(G) : No datae. Site requirements(I) : No data
- (5) Distribution in Kenya : Dry upper land forest, often plants in country areas as boundery marks(A).
- (6) Soil characteristics
- (7) Shade tolerance : Tolerant in young stage.
- (8) Mature tree's height : More than 35 m(A)
- (9) Mature tree's diameter
- (10) Utilization : Fuelwood, but the charcoal smoke can hurt the eyes.(B)
- (11) Others : The oil expected from seeds has been reported on very favourably for

medicinal purposes. The pounded bark is soaked in water overnight, the

extract is drunk as a remedy for intestinal worms, and for the treatment of whooping cough(E)

2 Seed

- (1) Month of flowering : January in Kaveta
- (2) Month of collection : July November in Kitui district.
- (3) Method of collection : To collect fruits, or fall them on the ground by rocking or hitting by pole then collect, or go up to a tree and take fruits. Collect from the ground

after falling.(B)

- (4) Method of preparation : To crack nuts and take out seeds then dry for 3 4 days.
- (5) Method of storage : Keep in tin with charcoal, cotton sack in dark room (or a well heated place).
- (6) Number of seeds per nut :
- (7) Number of seeds per Kg. or 1.: 1,000 seeds/kg.
- (8) Usual germination rate : 70 100%(D)
- (9) Provenance
- (10) Others

3 Seedling

- (1) Applied seed pretreatment: No pretreatment, (Germination is usually quick with no pretreatment required.(B)
- (2) Types of seedling
 - a. Pot seedling
- : Operational

b. Stump

- : Stumps are available
- c. Bare root
- : Not examined
- (3) Sowing month at Tiva Nursery : February to March.
- (4) Growing speed in the nursery : Fast.
- (5) Note for watering : Avoid too much watering.
- (6) Note for other things : If seedlings grow too high, treaming is available.

4 Plantation

- (1) Site condition
- (2) Land Preparation
- : (i) In 1987, total clearing, but not cut down useful trees more than 5cm in D.B.H (ii) In 1988, 1m width slashing and 2m remaining, the same as in (i) for

useful trees.

- (iii) In 1989, 2m width slashing and 1m remaining, the same as in (i) for useful trees.
- (3) Number of seedlings per ha
- : (i) In 1987, 1,000 seedlings/ha planted.
 - (ii) In 1988, 1,000 seedlings/ha
 - planted. (iii) In 1989, 830 seedlings/ha
 - planted.

(4) Size of planting hole : (i) In 1987, 45cm x 45cm (ii) In 1988, 45cm x 45cm (iii) In 1989, mostly 65cm x 65cm

- 3 -

(5) Weeding : Weeding is desirable 2 times per year.

(6) Damage

(7) Growing speed : Slightly fast growing

(8) Management(9) Some data from forestation

Some data	from for	estati	on sit	e				
Planted	Compart.	Compart. Areas Survival			ival r	ate	Heig	ht
year			Jul.	Nov.	Oct.	Oct.	Oct.	Oct.
			89	89	90	91	90	91
		ha	%	%	%	%	cm	cm
1987		1.57	44.5	-	27.5	25.0	134	170
		1.73	0.0	-	-	-	-	_
		1.33	0.0	-	-	-	_	-
Sub-total		4.69						
1988	I-E-1	3.38	89.0	89.5	85.5	88.0	62	93
	I-J-2	2.81	90.5	93.0	91.5	91.5	90	129
	II-B	3.79	92.0	87.5	91.0	91.5	95	156
	II-G-2	4.03	90.0	71.0	71.5	68.5	75	102
Sub-total		14.01	(09.4)	(85.0)				
1989	A-1-1(L)	0.88			94.5	84.0	37	58
	B - 2 - 3	0.55			98.0	86.5	42	62
	B - 3 - 3 (SW)	0.14			97.1	92.3	36	56
	D-4-4(SW)	0.28			92.3	66.0	27	39
	E-2-3(L)	0.38			98.0	92.5	50	79
	F - 4 - 3	0.08			78.0	65.5	31	48
Sub-total		2.31						

Note (L): Hole size is 65cm x 65cm. (SW): Spotweeding.

(10) Some data from extension

(11) Others

According to the experiment, the average height of $65\,\mathrm{cm} \times 65\,\mathrm{cm}$ hole size was 1.4 times and 1.2 times as tall as that of $25\,\mathrm{cm} \times 25\,\mathrm{cm}$, and $45\,\mathrm{cm} \times 45\,\mathrm{cm}$ hole size, after 2 years later experiment area being just set up, an increase was 469% for $25\,\mathrm{cm}$ hole size, 579% for $45\,\mathrm{cm}$ hole size, 700% for $65\,\mathrm{cm}$ hole size.

Species: Dalbergia melanoxylon

Cf. A:(97), B:84, C:169, D:42, 186, E:-, F:-, G:-, H:9, 11, I:249

1 Basic data

(1) Family name : Papilionaceaee

(2) Vernacular name : Muvingo(Kamba), Mpingo(Swahili),
African black-wood(English)(B).

(3) Origin : Indigenous

(4) Climatic condition

a. Preferred climatic type(B):

Zone III, 1 III, 2-3 IV, 1 IV, 2-3 V, 1-2 V, 3	Climatic type Kwale Kisumu/Murang'a Lamu Lake Victoria/Thika Taveta/Isiolo Kajiado(part)	Prec. 800-1400 800-1400 600-1100 600-1100 450- 900 450- 900	Evap. 1450-2200 1450-2200 1550-2200 1550-2200 1650-2300 1650-2300 1900-2400	Temp. 24-30 20-24 25-30 20-24 22-30 20-22 22-30	Alt. 0- 900 900-1800 0- 900 900-1800 0-1200 1200-1800 0-1200
VI, 1-2	Magadi/Garba Tula	300- 550	1900-2400	22-30	0-1200

Note; Prec. Average annual rain fall, mm

Evap. Average annual potential evaporation, mm

Temp. Mean annual temperature, (deg.C)

Alt. Altitude, m

b. Climate adaptability(D) : No data

c. Preferable ecological zone (H) :

C. 11	ELGENDIC COOLOR	orcar bone (n)		
Eco-Zone	Rainfall(mm)	Altitude(m)	Soil type Rotat	tion
III-Lowland	800-1,400	0-1,400	Variable, sandy to Lo	ong
		965	sandy-clay	
ΙV	400-800	0-1,400	Sandy to sandy-clay Med	dium
			soils to riverine to	long
			clay/sandy soils	
III-Lowland			Variable, sandy to Lo sandy-clay Sandy to sandy-clay Med	dium

- d. Environmental requirements(G): No data
- e. Site requirement(I): Needs sufficient moist soil, preferably near waterholes or watercourses, also on skeleton soils(I).
- (5) Distribution in Kenya : This species grows best in sub-humid and semiarid areas. Many trees can be found in the valleys east of Kitui Town(B)
- (6) Soil characteristics
- (7) Shade tolerance
- (8) Mature tree's height : 4 7m high, occasionally over 12m high(I).
- (9) Mature tree's diameter : 60 cm(C).
- (10) Utilization

: Fodder, wood for conversion into various products, medicine(D). Used for cleaning wounds, to alleviate abdominal pains, to relieve pain in joints(E). Like ebony, it is primarily used for

(9) Mature tree's height : 4 - 7m high, occasionally over 12m high (I). (10)Mature tree's diameter : 60 cm(C) (11)Others : Nitrogen-fixation. The tree can be regarded as ant and beetle proof, and is a prized wood among Kamba carvers and European instrument makers(B). This wood is very heavy, dencity 1.2(C) 2 Seed (1)Month of flowering (2)Month of collection : March in Tiva. (3)Method of collection (4)Method of preparation (5)Method of storage (6)Number of seeds per pod : (7)Number of seeds per Kg. or 1.: 6,000 - 16,000 seeds/kg.(D) (8): 15 - 50%(D) Usual germination rate (9)Provenance (10) Others : % 3 Seedling (1)Applied seed pretreatment: (2)Types of seedling a. Pot seedling : Operational b. Stump : Possible c. Bare root : Not examined Sowing month at Tiva Nursery : February Growing speed in the nursery : Slow (4)(5)Note for watering : Avoid too much watering. (6)Note for other things 4 Plantation (1) Site condition : (i) In 1988, strip clearing, 1m width (2) Land Preparation slashing and 2m remaining, but not cut down useful trees more than 5cm in D.B.H. (ii) In 1989, strip clearing, 2m width slashing and 1m remaining, the same as in (i) for useful trees. : (i) In 1988, 1,000 seedlings/ha Number of seedlings per ha (3)planted. (ii) In 1989, 830 seedlings/ha planted. : (i) In 1988, 45cm x 45cm (4) Size of planting hole (ii) In 1989, 65cm x 65cm : Weeding is very important, at least (5) Weeding 2 times per year. : (6) Damage

special applications such as musical

instruments, inlays and arts

(carving)(I).

(7) Growing speed : Very slow.

(8) Management

(9) Some data from forestation site Height Survival rate Planted Compart. Areas Jul.89 Nov.89 Oct.90 Oct.91 Oct.90 Oct.91 year % % cm CI % % ha 98.0 57 33 1.49 96.5 95.5 97.5 1988 I - F92.4 18 18 C-1-2(L)0.24 90.3 1989 Note (L): Hole size is 65cm x 65cm.

(10) Some data from extension

(11) Others

To be planted at the age of 5 months. After seven years upto 4m high (I).

The trees planted in compartment I-F were eaten by dik-diks.

Species: Delonix regia

Cf. A:59, B:-, C:171, D:43, 187, E:-, F:-, G:-, H:-, I:-

1 Basic data

- (1) Family name : Caesalpinaceae
- (2) Vernacular name : Mjohoro(Swahili), Flamboyant(English)
- (3) Origin : Madagascar
- (4) Climatic condition
 - a. Preferred climatic type(B) : No datab. Climate adaptability(D) : No data
 - c. Preferable ecological zone (H) : No data
 - d. Environmental requirements(G) : No datae. Site requirements(I) : No data
- (5) Distribution in Kenya : Common at the coast, but at Nairobi's altitude flowering only erratically(A).
- (6) Soil characteristics
- (7) Shade tolerance
- (8) Mature tree's height : 10 m, but under ideal conditions to 15 m(A).
- (9) Mature tree's diameter
- (10) Utilization : Shade/shelter, ornamental, fuelwood, edible seed pod, bee-forage(D).
- (11) Others : Nitrogen-fixation.

2 Seed

- (1) Month of flowering : January in Kaveta
- (2) Month of collection : July in Kaveta
- (3) Method of collection : To collect pods, or fall them on the ground by rocking or hitting by pole then collect, or go up to a tree and take pods.
- (4) Method of preparation : After drying pods for 3 7 days then take seeds from pod using a knife and dry for 2 3 days.
- (5) Method of storage
- (6) Number of seeds per pod :
- (7) Number of seeds per Kg. or 1.: 1,600 9,300 seeds/kg.(D)

:

- (8) Usual germination rate : 35 75%(D)
- (9) Provenance
- (10) Others

3 Seedling

- (1) Applied seed pretreatment: Stratify, soak in cold/tepid water for 24 hours, soak in concentrated H2So4 for 45 60 minutes, none pretreatment(D).
- (2) Types of seedling
 a. Pot seedling : Operational

b. Stump : Not examined : Not examined

(3) Sowing month at Tiva Nursery : March

(4) Growing speed in the nursery : Fast

(5) Note for watering : Avoid too much watering.

(6) Note for other things

4 Plantation

(1) Site condition :
(2) Land Preparation : In 1988, strip clearing 1 m width slashing and 1m remaining, but not cut down useful trees more than 5cm in

D. B. H.

(3) Number of seedlings per ha :In 1988,1,000 seedlings/ha planted

(4) Size of planting hole : In 1988, 45cm x 45cm

(5) Weeding : Weeding is very important, at least

2 times per year.

(6) Damage(7) Growing speed:

(8) Management :(9) Some data from forestation site

Some data from forestation site Height Planted Compart. Areas Survival rate Jul.89 Nov.89 Oct.90 Oct.91 Oct.90 Oct.91 year % % % CM CM % 13.0 3.5 1988 I - G1.49

- (10) Some data from extension
- (11) Others
 This species prefers high humid lower altitude area.

Species: Eucalyptus camaldulensis

Cf. A:193, B:86, C:336, D:47, 149, 193, E:-, F:-, G:126, H:9, 11, I:263

1 Basic data

(1)Family name : Myrtaceae

- (2)Vernacular name : Red river gum(English)
- (3)Origin : Eastern Australia
- Climatic condition (4)

	 a. Preferred climatic 	type(B):			
Zone	Climatic type	Prec.	Evap.	Temp.	Alt.
III, 1	Kwale	800-1400	1450-2200	24-30	0- 900
III, 2-3	Kisumu/Murang'a	800-1400	1450-2200	20-24	900-1800
IV, 1	Lamu	600-1100	1550-2200	24-30	0- 900
IV, 2-3	Lake Victoria/Thika	600-1100	1550-2200	20-24	900-1800
V, 1-2	Taveta/Isiolo	450- 900	1650-2300	22-30	0-1200
V, 3	Kajiado(part)	450- 900	1650-2300	20-22	1200-1800

Note; Prec. Average annual rain fall, mm

> Evap. Average annual potential evaporation, mm

450- 900

1650-2300 20-22

1200-1800

Temp. Mean annual temperature, (deg.C)

Alt. Altitude, m

b. Climate adaptability(D)

		Pour LIIOJ (2, .			
Zone	Prec.		Dry period		Tempera	ture
		Dry months	No. of DP	Mean	Lowest	Highest
Subhumid	600-1500	4-8	1		>18	_
Semi-arid, hot	250- 600	8-10	1 or 2	>18		
Semi-arid,						
warm to cold	250- 600	8-10	1 or 2	<18		
Arid, hot desert	<250	11-12	1	>18		
Arid, warm to						
cold	<250	11-12	1	<18		
Humid sub-						
tropics	>1200		None		-3 <t<18< td=""><td>>22</td></t<18<>	>22
Temperate						
maritime	>1200	-	None		-3 <t<18< td=""><td>10-22</td></t<18<>	10-22
Highland sub-						
humid 5	500-1200	2-6	1		-3 <t<18< td=""><td>>10</td></t<18<>	>10

Average annual rainfall, mm Dry months: Total number of dry months (<50 mm) per year No. of DP: Number of dry period per year.

Preferable ecological zone (H): С. Soil type Rainfall(mm) Altitude(m) Rotation Eco-Zone 0-1,400Red clay-loamy to sandy-Short 800-1,400 III-Lowland loamy soils (6-8yrs)Sandy to sandy-clay soils Short 0-1,400ΙV 400-800 to riverine clay/sandy (6 yrs) soils.

Environmental requirements(G): Because of the species occurs over such an extensive natural range, seeds collected from different localities may produce trees with very different appearance, growth rate, health, environmental tolerance and wood quality. It is criticaly important to get seeds from a climatic zone similar to that of the planting zone.

Temperature: The trees withstand high summer temperatures and are hardy down to 3 deg. C.

: Although mainly a tree of river plane, some provenances Altitude

can be grown in highland area.

: In its native habitat the species is found both in area Rainfall of low and high rainfall (200 - 1,250 mm). A lower limit

for commercial plantation is 400 mm annual rainfall.

: The tree adopts well to a wide variety of soils, Soil although, the provenance choice is very important.

e. Site requirement(I): Grows from sea level to approximately 600m altitude with precipitations over 250mm. Best growth in Africa with precipitation Tolerates a between 700 and 1,200 mm. dry season of over 8 months, also grows on poor degraded soils and tolerates short term flooding. Prefers deep silt with clay subsoil. Salt tolerance varies with provenance.

(5) Distribution in Kenya

: This species is one of the world's most widely planted trees, primarily in semiarid and Mediterranean climates. (B)

(6) Soil characteristics

: Sand or loam in soil texture, acid (pH < 6.5) or neutral (pH 6.5 - 7.5) in reaction, seasonal water logging, well This species is best water drainage. suited to areas having over 500mm of rain and dry seasons for not more than eight months' duration(B).

(7)Shade tolerance : Shade intolerant.

Mature tree's height (8)

: 20 to 50 m

Mature tree's diameter (9)

: 90 to 210 cm D.B.H.

(10)Utilization : Industrial purposes, fuelwood/charcoal, tanning/dyes, poles, ornamental essential oils, bee-forage, heavy construction, building poles, short fibre pulp(D).

(11) Others

: The dense red wood is resistant to termites(A).

2 Seed

- (1)Month of flowering Month of collection (2)
- (3)Method of collection Method of preparation (4)
- : (5)Method of storage

:

- (6)Number of seeds per Kg. or 1.: 90,000 - 400,000 seeds/kg.(D) 200,000 to 1,000,000 seeds/kg(I). (7)Usual germination rate : (8)Provenance : (9)Others : Seedling (1)Applied seed pretreatment: None pretreatment (2)Types of seedling a. Pot seedling : Operational b. Stump : Not examined c. Bare root : Not examined (3)Sowing month at Tiva Nursery : May to August Growing speed in the nursery : Fast (4)Note for watering : Avoid too much watering. (5)(6)Note for other things Plantation Site condition (1):(i) In 1988, strip clearing, 1m width (2)Land Preparation slashing and 2m remaining, but not cut down useful trees more than 5cm in D.B.H. (ii) In 1989, strip clearing, 2m width slashing and 1m remaining, the same as in (i) for useful trees. :(i) In 1988, 1,000 seedlings/ha Number of seedlings per ha (3)planted. (ii) In 1989, 830 seedlings/ha planted : (i) In 1988, 45cm x 45cm Size of planting hole (ii) In 1989, 65cm x 65cm Extensive : Weeding is very important. (5)Weeding weeding is mandatory(G). : Young trees and weakened by drought can (6)Damage be infected by moth lavae, eucalyptus snout beetle, termite, and eucalyptus borer(G).
- Some data from forestation site (9)Height Survival rate Compart. Areas Planted Jul.89 Nov.89 Oct.90 Oct.91 Sep.90 Oct.91 year % % CM CM % % ha 350* 0.5 26.5 0.79 1988 I - K227 174 76.0 82.0 C-1-1(L) 0.50 1989 Note * Only one tree' datum, (L): Hole size is 65cm x 65cm.

: Very fast

available(D).

: Coppicing and pollarding are

(10) Some data from extension

Growing speed

Management

3

4

(7)

(8)

(11) Others
Transplanted to field, spacing as close as 2m x 2m are used for fuelwood(G).

71

Species: Eucalyptus citriodora

Cf. A:, B:87, C:337, D:48, 193, E:-, F:-,G:128, H:-, I:-

Basic data 1

: Myrtaceae Family name (1)

Vernacular name : Lemon gum(English) (2)

: Queensland, Eastern Australia(B,C) Origin (3)

Climatic condition (4)

Zone II, 1 II, 2-3 II, 4 III, 1 III, 2-3 III, 4 IV, 1 IV, 2-3	a. Preferred climatic Climatic type Ramisi Migori Limuru(part) Kwale Kisumu/Murang'a Nairobi(part) Lamu Lake Victoria/Thika	type(B): Prec. 1000-1600 1000-1600 800-1400 800-1400 800-1400 600-1100 600-1100	Evap. 1300-2100 1300-2100 1300-2100 1450-2200 1450-2200 1550-2200 1550-2200	Temp. 24-30 20-24 18-20 24-30 20-24 18-20 24-30 20-24 18-20	Alt. 0- 900 900-1800 1500-1850 0-900 900-1800 1500-1800 1500-1850
IV, 4	Rumuruti/Narok(part)	600-1100	1550-2200	18-20	1900-1890

Average annual rain fall, mm Note; Prec.

Evap. Average annual potential evaporation, mm

Mean annual temperature, (deg.C) Temp.

Altitude, m Alt.

: No data b. Climate adaptability(D) Preferable ecological zone (H) : No data C. Environmental requirements(G) : No data

Temperature: The trees withstand both high temperature (29 - 35 deg. C mean monthly maximum) and light frosts.

: It occurs at altitude from sea level up to 900 m in Altitude Queensland, but in Sri-Lanka it has been grown at elevations as high as 2,000 m.

: In its native habitat, it tolerates dry season of 5 - 7 Rainfall months. The minimum required annual rainfall is 600 mm,

but for best growth, over 900 mm is desirable.

: In its native habitat, this tree occurs on rolling Soil country side where the soils are generally poor and gravlly including podzols, residual podzols of lateric origin, and infertile clay. It seems to prefer welldrained soil.

Site requirements(I): No data

- : This species needs about 900 mm rain (5) Distribution in Kenya annually and tolerates up to 7 months drought(B).
- Soil characteristics (6)
- Shade tolerance (7)
- (8)Mature tree's height : 30 - 40 m(C)Mature tree's diameter (9): 1.3 m(G).
- (10)Utilization : Industrial purposes, fuelwood, charcoal, essential oil, timber, posts,

bee-forage, ornamental(D). Saw-timber, perfume(G). (11) Others 2 Seed (1)Month of flowering (2)Month of collection (3)Method of collection (4)Method of preparation (5)Method of storage Number of seeds per kg. or 1. : 108,000 - 124,000 seeds/kg.(D) (6)Usual germination rate : 60 - 90%(D) (7)Provenance (8)(9) Others 3 Seedling Applied seed pretreatment: None pretreatment (1)(2)Types of seedling a. Pot seedling : Operational b. Stump : Not examined c. Bare root : Not examined Sowing month at Tiva Nursery : May to August (4)Growing speed in the nursery : Fast (5)Note for watering : Avoid too much watering. Note for other things 4 Plantation (1)Site condition (2)Land Preparation : In 1987, total clearing but not cut down useful trees more than 5 cm in D.B.H. Number of seedlings per ha : In 1987 1,000 seedlings/ha planted (4)Size of planting hole : 45cm x 45cm (5)Weeding : Weeding is very important, at least 2 times per year. (6)Damage : Young trees are susceptible to termite damage(B). : Fast growing (7)Growing speed (8)Management : Coppicing is available(B). Some data from forestation site (9) Planted Compart. Areas Survival rate Height Jul. 89 Nov. 89 Oct. 90 Oct. 91 Oct. 90 Oct. 91 year ha % % % % CM CM 1987 1.23 (10)Some data from extension (11)This is better suited to moist climates, though in its natural

habitat it extends into area with only 600 mm of rainfall(?).

```
Species: Eucalyptus paniculata
Cf. A:193, B:, C:, D:52, 195, E:-, F:-, G:-, H:-, I:-
      Basic data
1
                              : Myrtaceae
           Family name
      (1)
                              : Coastal Queensland and New South Wales,
           Vernacular name
      (2)
           Origin
      (3)
                                Australia
           Climatic condition
      (4)
                                               : No data
                Preferred climatic type(B)
            a.
                                                : No data
                Climate adaptability(D)
                Preferable ecological zone (H) : No data
                Environmental requirements(G) : No data
            d.
                                                : No data
                Site requirements(I)
           Distribution in Kenya : Common in Ngong area(A).
                                   : Often on black-cotton soil(A).
           Soil characteristics
       (6)
           Shade tolerance
       (7)
                                    : High (25 - 40m) (C)
           Mature tree's height
       (8)
           Mature tree's diameter
       (9)
                                    : Converted timber, posts, fuelwood, bee-
          Utilization
      (10)
                                      forage, ornamental(D).
      (11) Others
 2
       Seed
            Month of flowering
       (1)
            Month of collection
       (2)
            Method of collection
       (3)
            Method of preparation
       (4)
            Method of storage
       (5)
       (6) Number of seeds per kg. or 1. : 112,000 - 2,021,400 seeds/kg.(D)
            Usual germination rate : 30 - 70%(D)
       (7)
       (8) Provenance
       (9) Others
  3
       Seedling
            Applied seed pretreatment: None pretreatment
            Types of seedling
        (2)
                                     : Operational
            a. Pot seedling
                                     : Not examined
            b. Stump
                                     : Not examined
            c. Bare root
            Sowing month at Tiva Nursery :
            Growing speed in the nursery : Fast
        (4)
                                : Avoid too much watering.
            Note for watering
            Note for other things
  4
        Plantation
```

(1) Site condition

(2)	down useful D.B.H. (ii) In 1988 slashing and	total clearing, but not cut trees more than 5cm in 3, strip clearing, 1m width 1 2m remaining, the same as useful trees.
(3)	(iii) In 198 slashing and in (i) for Number of seedlings per ha : (i) Is plant	19, strip clearing, 2m width d 1m remaining, the same as useful trees. In 1987, 1,000 seedlings/ha ed.
(4)	(iii) plants) Size of planting hole : (i) Ir (ii) 1	In 1989, 830 seedlings/ha ed. n 1987, 45cm x 45cm In 1988, 45cm x 45cm
(5)) Weeding : Weeding is v	In 1989, 65cm x 65cm very important, at least
(6)	2 times per :	year.
(7)		
(-)	growing (A).	s is hardy but fairly slow
(8)) Management : growing(A).	
(9)		
		ival rate Height
		et.90 Oct.91 Oct.90 Oct.91
	ha % %	% % cm cm
	1987 0.64 1.99	, a cm cm
	Sub-total 2.63	
	1988 I-L-3 0.49 25.0 12.5	
	1989 D-2-3(L) 0.67	42.8 15.9 51 82
	Note (L): Hole size is 65cm x 65cm.	

- (10) Some data from extension
- (11) Others

```
Species: Eucalyptus tereticornis
Cf. A:, B:, C:342, D:54, 196, E:-, F:-, G:-, H:-, I:-
      Basic data
1
                               : Myrtaceae
      (1)
           Family name
                               : Forest red gum, Blue gum(English)
      (2)
           Vernacular name
                               : Australia
      (3)
           Origin
           Climatic condition
      (4)
                Preferred climatic type(B): No data
                Climate adaptability(D)
                                                            Temperature
                               Dry period
                   Prec.
      Zone
                                                           Lowest
                                                                     Highest
                          Dry months No. of DP
                                                   Mean
Monsoonal, short
                                                             >18
                                            1
                  >1500
                              <4
  dry season
                                                              >18
                                            1
                             4 - 8
                 600-1500
Subhumid
                                         1 or 2
                                                   >18
                             8-10
                 250- 600
Semi-arid, hot
Highland sub-
                                                                         >10
                                                           -3<t<18
                                            1
                             2 - 6
                 500-1500
  humid
                               Average annual rainfall, mm
             Note; Prec.
                   Dry months: Total number of dry months
                                                            (<50 mm) per year
                   No of DP: Number of dry period per year
                 Preferable ecological zone (H) : No data
             С.
                 Environmental requirements(G) : No data
             d.
                                                  : No data
                 Site requirements(I)
            Distribution in Kenya
       (5)
       (6)
            Soil characteristics
            Shade tolerance
       (7)
                                     : 30 - 45 m(C)
            Mature tree's height
       (8)
                                     : 90 - 150 cm D.B.H.(C)
            Mature tree's diameter
       (9)
                                      : Industrial purposes, fuelwood/charcoal,
            Utilization
      (10)
                                        construction, boxes, building poles,
                                        short fibre pulp, oils, bee-forage,
                                        ornamental(D).
      (11) Others
 2
       Seed
            Month of flowering
       (1)
            Month of collection
       (2)
       (3)
            Method of collection
            Method of preparation
       (4)
       (5)
            Method of storage
            Number of seeds per kg. or 1. : 90,000 - 400,000 seeds/kg.(D)
       (6)
                                    : 55 - 80\%(D)
       (7)
            Usual germination rate
       (8)
            Others
 3
       Seedling
```

Applied seed pretreatment: None pretreatment

- (2) Types of seedling a. Pot seedling : Operational b. Stump : Not examined c. Bare root : Not examined (3)Sowing month at Tiva Nursery : May to August (4)Growing speed in the nursery : Fast Note for watering : Avoid too much watering. (6)Note for other things Plantation (1)Site condition (2) Land Preparation : (i) In 1987, total clearing, but not cut down useful trees more than 5cm in (ii) In 1989, 2m width slashing and 1m remaining, the same as in (i) for useful trees. (3) Number of seedlings per ha : (i) In 1987, 1,000 seedlings/ha planted. (ii) In 1989, 830 seedlings/ha planted. (4) Size of planting hole : (i) In 1987, 45cm x 45cm (ii) In 1989, 65cm x 65cm (5) Weeding : Weeding is very important, at least 2 times per year. (6) Damage : Young trees are susceptible to termite damage.
- (7)Growing speed : Fast
- (8)Management
- (9)Some data from forestation site Planted Compart. Areas Survival rate Height Jul. 89 Nov. 89 Oct. 90 Oct. 91 Sep. 90 Oct. 91 year ha % % % % CM CM 1987 2.57 0.55 67.5 46.5 117 1989 D-2-1(L)116

Note(L) : Hole size is 65cm x 65cm

- (10) Some data from extension
- (11) Others

4

Species: Gmelina arborea

Cf. A:, B:92, C:435, D:58, 141, 202, E:-, F:-, G:46, H:10, I:-

1 Basic data

(1) Family name : Verbenaceae

(2) Vernacular name : -

(3) Origin : The moistre forest of South Asia, from India through Southern China(B).

(4) Climatic condition

a. Preferred climatic type(B):

Zone	Climatic type	Prec.	Evap.	Temp.	Alt.
I, 3-4	Kakamega	1100-1700	1200-2000	18-22	1200-1850
II, 1	Ramisi	1000-1600	1300-2100	24-30	0- 900
11, 2-3	Migori	1000-1600	1300-2100	20-24	900-1800
III, 1	Kwale	800-1400	1450-2200	24-30	0- 900
111, 2-3	Kisumu/Murang'a	800-1400	1450-2200	20-24	900-1800
IV, 1	Lamu	600-1100	1550-2200	24-30	0- 900
IV, 2-3	Lake Victoria/Thika	600-1100	1550-2200	20-24	900-1800

Note; Prec. Average annual rain fall, mm

Evap. Average annual potential evaporation, mm

Temp. Mean annual temperature, (deg.C)

Alt. Altitude, m

b. Climate adaptability(D) :

Web			0 1 - /			
Zone	Prec.	Dry	period		Temper	ature
	Dry	months	No. of DP	Mean	Lowest	Highest
Monsoonal	>1500	< 4	1		>8	
Subhumid	600-1500	4 - 8	1		>18	
Humid sub-						
tropics	>1200	-	None		-3 <t<18< td=""><td>>22</td></t<18<>	>22
Temperate						
maritime	>1200	_	None		-3 <t<18< td=""><td>10-22</td></t<18<>	10-22

Note; Prec. Average annual rainfall, mm

Dry months: Total number of dry months (<50 mm) per year

No of DP: Number of dry period per year

c. Preferable ecological zone (H):

	Rainfall(mm)	Altitude(m)	Soil type		Rotation
III Low-land	800-1,400	0-1,400	Sandy to sandy	loam	Short
			soils		(15-25 yrs)

d. Environmental requirements(G):

Temperature: This tree withstands up to 52 deg. C, but can be severely injured by frost.

Altitude : Up to 1,000 m.

Rainfall: It grows satisfactorily on sites that receive from 750 mm to 5,500 mm annually. At best some provenance have drought tolerance: in West Africa, this species is grown where the dry season is 7 months long.

soil types: acid soil, calcareous loams, and lateritic soil. It produces best in moist, base-rich, well-drained alluvium. Site requirements(I): No data Distribution in Kenya : Sundy soil, neutral(pH 6.5 - 7.5) in (6) Soil characteristics reaction, well drained in drainage(D). (7)Shade tolerance : Under optimum condition it may reach (8) Mature tree's height heights of about 30 m, but it is usually about 20 m(G). (9)Mature tree's diameter : Timber, fuelwood, furniture, plywood, (10) Utilization matches(B), pulp, honey(G). (11) Others 2 Seed Month of flowering (1)Month of collection (2)(3)Method of collection Method of preparation Method of storage (4)(5)Number of seeds per fruit: (6)Number of seeds per kg. or 1.: 400 - 3,000 seeds/kg.(D), (7)2,000 - 3,000 seeds/kg(B). : 90 - 100%(D) (8)Usual germination rate Provenance (9): Others (10)3 Seedling (1) Applied seed pretreatment: None pretreatment, soak in concentrated H2So4 for 45 - 60 minutes, soak in cold/ tepid water for 48 hours(D). Types of seedling (2): Operational a. Pot seedling : Stump is available b. Stump : Not examined c. Bare root Sowing month at Tiva Nursery : January to February (3)Growing speed in the nursery (4): Avoid too much watering. Note for watering (5): Although this species is mainly native Note for other things (6)to moist forests, it occurs in some comparatively dry area in central India (G). Plantation Site condition (1): In 1988, strip clearing with 1m width (2) Land Preparation slashing and 2m remaining, but not cut down useful trees more than 5cm in

: It is fairly adaptable and survives well on wide range of

Soil

D.B.H.

: In 1988, 1,000 seedlings/ha (3) Number of seedlings per ha planted.

: In 1988, 45cm x 45cm Size of planting hole

: Weeding is essential during the first (4)year: this species cannot compete with Weeding (5)

aggressive grasses or vines(G).

: Seeds and foliages are eaten widly by Damage deer and rabbits, cattle eat foliage (6)

and barks of young trees(G).

: Very fast (7)Growing speed

: Coppicing is available(D). Coppice Management (8)

rotations are usually at 5 years intervals for fuel(but in some the

moist area)(G).

Some data from forestation site (9)Height Survival rate Compart. Areas Planted Jul.89 Nov.89 Oct.90 Oct.91 Oct.90 Oct.91 year CI % CM % ha

114 161 87.7 84.9 89.7 62.0 I - G0.121988

(10) Some data from extension

(11) Others

A spacing 2 m x 2 m has been recommended for fuelwood plantation in Malaysia(G). The trees are seldom killed by fire, but fire damage can facilitate insect and fungal attack(G). This species is planted in coast area.

Species: <u>Grevillea</u> <u>robusta</u>

Cf. A:233, B:93, C:-, D:58, 142, 202, E:-, F:-, G:-, H:6, 7, I:-

1 Basic data

(1)Family name : Proteaceae

(2)Vernacular name : Mkima(Kikuyu), Silki oak, grevillea(English)(A).

(3)Origin : Sub-tropical region of Queensland and New South Wales, Australia(B).

(4)Climatic condition

a. Preferred climatic type(B):

		of be (D).			
Zone	Climatic type	Prec.	Evap.	Temp.	Alt.
I, 3-4	Kakamega	1100-1700	1200-2000	18-22	1200-1850
I, 5-6	Kericho	1100-1700	1200-2000	14-18	1850-2450
II, 3	Migori(part)	1000-1600	1300-2100	20-22	1200-1800
II, 4-6	Limuru	1000-1600	1300-2100	14-20	1500-2450
	umu/Murang'a(part)	800-1400	1450-2200	20-22	1200-1800
III, 4-5	Nairobi	800-1400	1450-2200	16-20	1500-2150
IV, 3	Lake Victoria/				
	Thika(part)	600-1100	1550-2200	20-22	1200-1800
IV, 4-5 Rum	uruti/Narok(part)	600-1100	2550-3300	16-20	1500-2150

Note; Prec. Average annual rain fall, mm

> Evap. Average annual potential evaporation, mm

Temp. Mean annual temperature, (deg.C)

Alt. Altitude, m

b. Climate adaptability(D) :

	S. OIIIIGCC	anabeantitel	(D)			
Zone	Prec.	Dry pe	eriod		Tempera	ature
		Dry months	No. of DI	P Mean	Lowest	Highest
Humid sub-						District
tropics	>1200	-	None		-3 <t<18< td=""><td>>22</td></t<18<>	>22
Temperate						
maritime	>1200	-	None		-3 <t<18< td=""><td>10-22</td></t<18<>	10-22
Highland sub	o –					
humid	500-1200	2-6	1		-3 <t<18< td=""><td>>10</td></t<18<>	>10
(Semi-arid,						
hot)	250-600	11-12	1	>18		
(Semi-arid,	warm					
to cold)	250-600	11-12	1	<18		
- restriction of the state of t	Note; Prec.	Averag	e annual	rainfall,	mm	

Dry months: Total number of dry months (<50 mm) per year No of DP: Number of dry period per year

Preferable ecological zone (H): C.

Rotation Altitude(m) Soil type Eco-Zone Rainfall(mm) Most variable but Short (6yrs II Over 1,400 0-2,500loves deep red soils for pole) (30yrs for timber)

```
Variable spectrum
                             0-2,500
            800-1,400
                                                                for pole)
III High-
                                         of soil adaptation
    land
                                                                (30yrs for
                                                                timber)
                                          : No data
          Environmental requirements(G)
      d.
                                           : No data
          Site requirements(I)
      e.
                               : This species was brought to Kenya for
     Distribution in Kenya
                                 use as a coffee and tea shade.
(5)
                                 be grown in shambas without any crop
                                 with any negative effect(B).
                                 The tree is very widely planted from
                                 1,200 m(A).
                               : Loamy soil, neutral(pH 6.5 - 7.5) in
     Soil Characteristics
(6)
                                 reaction, well drained soil(D).
     Shade tolerance
(7)
                               : 20 m or more(A)
     Mature tree's height
(8)
     Mature tree's diameter
(9)
                               : Fuelwood/charcoal, timber, furniture,
(10) Utilization
                                 boxes, bee-forage, veneer/plywood,
                                 ornamental, windbreak(D).
(11) Others
Seed
                               : January in Kaveta or Matinyani.
      Month of flowering
 (1)
                               : March in Kaveta or Matinyani.
      Month of collection
 (2)
                               : To collect fruits, or fall them on the
      Method of collection
 (3)
                                 ground by rocking or hitting by pole
                                 then collect, or go up to a tree and
                                 take fruits.
      Method of preparation
 (4)
                               : Viability is short, about 3 months(B).
      Method of storage
 (5)
      Number of seeds per fruit: '
 (6)
      Number of seeds per Kg. or 1. : 51,000 - 150,000 seeds/kg.(D)
 (7)
                              : 30 - 90\%(D)
      Usual germination rate
 (8)
      Provenance
 (9)
                               :
(10) Others
 Seedling
      Applied seed pretreatment: None pretreatment(D).
 (1)
      Types of seedling
 (2)
                                : Operational
      a. Pot seedling
                                : Not examined
      b. Stump
                               : Not examined
      c. Bare root.
      Sowing month at Tiva Nursery : March to May
 (3)
      Growing speed in the nursery :
 (4)
      Note for watering
                                : Avoid too much watering.
 (5)
      Note for other things
 (6)
 Plantation
 (1) Site condition
                                :
```

2

3

4

Short(Gyrs

(2)	. (1)	In 1988, strip clearing, 1m width
	sla	shing and 2m remaining but not cut
	dow	n useful trees more than 5cm in
	D.B	.H.
	(ii) In 1989, strip clearing, 2m width
	sla	shing and 1m remaining,
	sam	e as in (i) for useful trees.
(3)	Number of seedlings per ha	: (i) In 1988, 1,000 seedlings/ha
		planted.
		(ii) In 1989, 830 seedlings/ha
		planted.
(4)	Size of planting hole	: (i) In 1988, 45cm x 45cm
	•	(ii) In 1989, 65cm x 65cm
(5)	Weeding : Wee	ding is very important, at least
1000 1000		imes per year.
(6)		ng trees are very sucseptible to
		mite damage in the Pilot Forest.
(7)		y fast
(8)		To the state of th
(0)		picing, pollading and pruning are
(0)		ilable(D).
(9)	A STATE OF THE STA	
	Planted Compart. Areas	
	year Jul.89	Nov.89 Oct.90 Oct.91 Oct.90 Oct.91
	ha %	
	1988 II-F-2 2.26 83.0	90.0 72.0 59.5 64 95
	1989 D-2-2(L) 0.31	83.0 52.5 89 107

(10) Some data from extension

Note(L) : Hole size is $65 \text{cm} \times 65 \text{cm}$

(11) Others

Species: Leucaena leucocephala

Cf. A:217, B:97, C:183, D:64, 143, 208, E:-, F:-, G:50, H:10, 12, I:317

Basic data 1

: Mimosaceae Family name (1)

Vernacular name (2)

: The drier western side of Central America. Origin (3)

Climatic condition (4)

Preferred climatic type(B): Alt. Temp. Prec. Evap. Climatic type 7.one 20-22 1200-1800 1100-1700 1200-2000 Kakamega(part) I, 3 0 - 90024 - 301300-2100 1000-1600 II,1 Ramisi 900-1800 20 - 241300-2100 11, 2-3 1000-1600 Migori

0-900 24 - 30800-1400 1450-2200 III, 1 Kwale 20 - 24900-1800 1450-2200 800-1400 111, 2-3 Kisumu/Murang'a 24 - 300 - 9001550-2200 600-1100 Lamu IV, 1 900-1800 20 - 24600-1100 1550-2200 IV, 2-3 Lake Victoria/Thika

Average annual rain fall, mm Note; Prec.

Average annual potential evaporation, mm Evap.

Mean annual temperature, (deg.C) Temp.

Altitude, m Alt.

b. Climate adaptability(D)

I.J.	CIIIICLU	adapor	cottro, (<i>U</i> ,				
	Prec.		Dry period			Temper	rature	
		Dry			of DP	Mean	Lowest	Highest
	>1500		-	Ŋ	ione		>18	
	>1500		<4		1		>18	
1	600-1500	£	1-6		1		>18	
	>1200		-	Ī	None		-3 <t<18< td=""><td>>22</td></t<18<>	>22
	>1200		-	ì	None		-3 <t<18< td=""><td>10-22</td></t<18<>	10-22
	250-600	8	3-10	1	or 2			
	()	>1500 >1500 >1500 600-1500 >1200	Prec. Dry >1500 >1500 600-1500 >1200 >1200	Prec. Dry p Dry months >1500 - >1500 <4 600-1500 4-6 >1200 - >1200 -	Prec. Dry period Dry months No. >1500 - 1500	Prec. Dry period Dry months No. of DP >1500 - None >1500 <4 1 600-1500 4-6 1 >1200 - None >1200 - None	Prec. Dry period Dry months No. of DP Mean >1500 - None >1500 <4 1 600-1500 4-6 1 >1200 - None >1200 - None	Prec. Dry period Dry months Temper No. of DP Mean Lowest >1500 - None >18 >1500 <4

Average annual rainfall, mm Note; Prec.

> Dry months: Total number of dry months (<50 mm) per year No of DP: Number of dry period per year.

Preferable ecological zone (H): C.

Eco-Zone Rainfall(mm) Soil type Altitude(m) Rotation III Low-800 - 1,4000 - 1,400Clay-loamy to sandy Short land soils. IV 400-800 0-2,000Variable but prefers Short slightly alkaline

Environmental requirements(G):

Temperature: This species is restricted to the tropics and sub-tropics;

frost kills it.

Altitude : This is a species for lowland area mainly below 500 m.

The plant continues growing at high elevations, but

without its lowland vigor.

Rainfall : The species grows best where annual rainfall is 600 - 1,700 mm. Soil : Root system of this species allows it to tolerate a wide array of soil conditions. It is found in soil varying from rock to heavy clay to coral. Unaided, this species grows well on in neutral or alkaline (especially limestone) soil. Site requirements(I): Average annual rainfall of 400 - 800mm, but tolerates dry seasons of 4 - 5 This species is not very months. sensitive with regard to soils, but high yields can only be expected in areas with reasonably fertile and well-drained site. Near-neutral or alkaline soils with a high moisture content are preferred. : This species has an undeserved (5)Distribution in Kenya reputation for drought tolerance, and it does best near the coast and in places like Kitui, Kisumu/Murang'a(B). : Loam, sand in soil texture, Alkali(pH> (6) Soil characteristics 7.5) and neutral(6.5 < pH < 7.5) in reaction, seasonal water logging or well drained in drainage(D). : The site should be carefully weeded Shade tolerance (7)before seeding and during the first growing season(D). : 5 - 8m, but dependent on variety growing Mature tree's height (8)up 20m. Mature tree's diameter (9): Industrial purposes, soil improvement, Utilization (10)green manure, fence posts, fuelwood/ charcoal, fodder, building posts, short fibre pulp, bee-forage(D). : Nitrogen-fixation (11) Others It is very important to know that this species has a great number of varieties e.g. common or "Hawaiian" type upto 5m high, Giant or "Salvador" type, upto 20m high, "Peru" type upto 15m. Even seedlings develop a comparatively big taproot to resist drought(I).

Seed

(1) (2) (3) (4)	Month of flowering Month of collection Method of collection Method of preparation	:	January in Kaveta and Matinyani. March in Kaveta and Matinyani. To go up a tree and take pods. After drying the pods, then put into a sack and hit by a pole.
(7)	Method of storage Number of seeds per pod Number of seeds per Kg. Usual germination rate	or	1. : 13,000 - 34,000 seeds/kg.(D) 50 - 85%(D)

85

Provenance (9)

(10)Others

Seedling 3

- Applied seed pretreatment: Soak in hot water for 12 hours (D).
- Types of seedling (2)

: Operational a. Pot seedling : Not examined b. Stump : Not examined c. Bare root

- Sowing month at Tiva Nursery : May to June (3)
- Growing speed in the nursery : Fast (4)
- : Avoid too much watering. Note for watering (5)
- Note for other things (6)

Plantation 4

Site condition (1)

- : (i) In 1987, total clearing, but not Land Preparation (2)cut down useful trees more than 5cm in D.B.H.
 - (ii) In 1988, 1m width slashing and 2m remaining, the same as in (i) for useful trees.
 - (iii) In 1989, 2m width slashing and 1m remaining, the same as in (i) for useful trees.
- Number of seedlings per ha (3)
- : (i) In 1987, 1,000 seedlings/ha planted.
 - (ii) In 1988, 1,000 seedlings/ha planted.
 - (iii) In 1989, 830 seedlings/ha planted.
- : (i) In 1987, 45cm x 45cm Size of planting hole (4)(ii) In 1988, 45cm x 45cm

(iii) In 1989, 65cm x 65cm

- : Weeding is very important. Once rapid (5)Weeding growth begins the plants form canopy
- of foliage that shade out weed(G). : Common pests are seed weevils, twig (6) Damage borers, and termites(G).
- : Very fast. (7)Growing speed
- : Coppicing, pollading and pruning are (8) Management available(D).
- Some data from forestation site (9) Survival rate Height Compart. Areas Planted Jul.89 Nov.89 Oct.90 Oct.91 Oct.90 Oct.91 year % CI % % Cm % ha 20.0 20.5 269 311 1.20 1987 110 22 0.93 52.7 47.0 26.5 26.0 1988 II-J-156.0 37.7 23 23 E-1-1(L) 0.18 1989
 - Note (L): Hole size is 65cm x 65cm
- Some data from extension (10)
- Others (11)

Its foliage contains mimosin, toxi to ruminants if consumed in excessive amounts(G).

Species: Melia azedarach

Cf. A:145, B:, C:257, D:67, 143, 211, E:-, F:-, G:-, H:-, I:-

1 Basic data

(1)Family name : Meliaceae

(2)Vernacular name : Beed tree, Persian lilac, Chinaberry(English)(A).

(3)Origin : Western Asia, Himalayas.

(4)Climatic condition

Preferred climatic type(B) : No data

Climate adaptability(D)

U.	Cilmate at	iapcability(D	;			
Zone	Prec.	Dry pe	riod		Tempe	rature
		Dry months	No. of DP	Mean	Lowest	Highest
Monsoonal	>1500	< 4	1		>18	
Sub-humid	600-1500	4-8	1		>18	
Semi-arid, hot	250- 600	8-10	1 or 2	>18		
Semi-arid, warm						
to cold	250- 600	8-10	1 or 2	<18		
Humid sub-tropi	cs >1200	_	None		-3 <t<18< td=""><td>>22</td></t<18<>	>22
Temperate marit	ime >1200	_	None		-3 <t<18< td=""><td>10-22</td></t<18<>	10-22
Highland sub-						
humid	500-1200	2-6	1		-3 <t<18< td=""><td>>10</td></t<18<>	>10

Average annual rainfall, mm Note; Prec. Dry months: Total number of dry months (<50 mm) per year No of DP: Number of dry period per year

Preferable ecological zone (H) : No data d. Environmental requirements(G) : No data Site requirements(I) : No data

(5)Distribution in Kenya : Fairly widely planted in Kenya up to 2,000 m(A).

(6) Soil characteristics : Sandy soil, acid(pH < 6.5) or neutral (pH 6.5 - 7.5) in reaction, well drainaged soil, shallowness (less than 50 cm), salinity(D).

Shade tolerance (7)

Mature tree's height : 10 m(A)(8)

Mature tree's diameter (9)

: Timber, fuelwood/charcoal, live fencing Utilization (10)bee-forage, pesticide, ornamental essential oil, wood-tool/utensils, posts, medicine(D).

(11) Others

2 Seed

- : January in Kaveta and Matinyani. Month of flowering (1): April in Kaveta and Matinyani.
- Month of collection (2)

: To collect fruits, or fall them on the (3) Method of collection ground by rocking or hitting by a pole then collect, or go up to a tree and take fruits. : Dry seeds. Method of preparation (4)(5) Method of storage (6) Number of seeds per fruit: Number of seeds per Kg. or 1.: 475 - 2,800 seeds/kg.(D) (7)(8) Usual germination rate : 55 - 85%(D) (9) Provenance : (10) Others Seedling (1) Applied seed pretreatment: Soak in cold/tapid water for 48 hours, scarify mechanically or none pretreatment(D). Types of seedling (2) : Operational a. Pot seedling : Not examined b. Stump : Not examined c. Bare root Sowing month at Tiva Nursery : March to May (3)(4) Growing speed in the nursery : Fast : Avoid too much watering. Note for watering (5)Note for other things (6)Plantation Site condition (1): (i) In 1987, total clearing, but not cut (2) Land Preparation down useful trees more than 5cm in D.B.H. (ii) In 1988, 1m width slashing and 2m remaining, the same as in (i) for useful trees. (iii) In 1989, 2m width slashing and 1m remaining, the same as in (i) for useful trees. : (i) In 1987, 1,000 seedlings/ha (3) Number of seedlings per ha planted. (ii) In 1988, 1,000 seedlings/ha planted. (iii) In 1989, 830 seedlings/ha planted. : (i) In 1987, 45cm x 45cm. (4) Size of planting hole (ii) In 1988, 45cm x 45cm.

3

4

(5)

(6)

(7)

(8)

Weeding

Damage

Growing speed Management

; 88

: Fast

(iii) In 1989, 65cm x 65cm.

2 times per year.

available(D).

: Weeding is very important, at least

: Budding, coppicing and lopping are

(9) Some data from forestation site

Planted	Compart.	Areas	5	Su	rvival	rate	I	leight
year			Jul.89	Nov.89	Oct.90	Oct.91	Oct.90	Oct.91
		ha	%	%	%	%	cm	CM
1987		0.48						
		0.92						
Sub-tota	1	1.40						
1988	II-G-3	2.44	80.5	11.0	32.0	1.0	39	=
1989	E-1-2(L	0.55			31.5	2.0	24	24
Note (L)	: Hole si	ze is	65cm x	65cm.				

(10) Some data from extension

(11) Others

This species is short-lived(A).

(1)

Month offlowering

```
Species: Melia volkensii
Cf. A:145, B:100, C:, D:, E:157, F:-, G:-, H:12, I:-
      Basic data
1
                               : Meliaceae
           Family name
      (1)
                               : Mukau(Kikuyu), Kirumbotu(Taita),
           Vernacular name
      (2)
                                 Melia(English)
                               : Indigenous
      (3)
           Origin
           Climatic condition
      (4)
                Preferred climatic type(B):
                                                              Temp.
                                                                          Alt.
                                                    Evap.
      Zone
                  Climatic type
                                       Prec.
                                                                         0 - 900
                                                              24 - 30
                                                  1550-2200
                                      600-1100
      IV, 1
                  Lamu
                                                              20 - 24
                                                                       900-1800
               Lake Victoria/Thika
                                                  1550-2200
                                      600-1100
      IV, 2-3
                                                              22 - 30
                                                                         0 - 1200
                                      450- 900
                                                  1650-2300
      V, 1-2
                  Taveta/Isiolo
                                                              20-22
                                                                       1200-1800
                                                  1650-2300
      V, 3
                                      450- 900
                  Kajiado(part)
                                                                         0 - 1200
                                                              22-30
                                      300- 550
                                                  1900-2400
               Magadi/Garba Tula
      VI, 1-2
                                                              20 - 22
                                                                      1200-1800
                                      300- 550
                                                  1990-2400
      VI, 3
                  Kirimun(part)
                          Average annual rain fall, mm
            Note: Prec.
                         Average annual potential evaporation, mm
                   Evap.
                          Mean annual temperature, (deg.C)
                   Temp.
                   Alt.
                          Altitude, m
                Climate adaptability(D)
                                            : No data
                 Preferable ecological zone (H):
            C.
      Eco-Zone
                   Rainfall(mm)
                                  Altitude(m)
                                                 Soil type
                                                                        Rotation
      1 V
                   400-800
                                  1,000-1,400
                                                Sandy to sandy-clay
                                                                         Short
                                                soils riverine clay/
                                                sandy soils.
            d.
                 Environmental requirements(G)
                                                  : No data
                 Site requirements(I)
                                                  : No data
             e.
                                     : Widely distributed from sea-level to
       (5) Distribution in Kenya
                                        1,200 m in lower semi-arid savannah
                                       districts such as Kitui, Machakos,
                                       Samburu, Taita and Voi(A).
       (6)
           Soil characteristics
       (7)
           Shade tolerance
           Mature tree's height
       (8)
                                     : 15 m(A)
           Mature tree's diameter
       (9)
           Utilization
     (10)
                                      : Timber (very good quality)(A). Used as
                                        a cure for pain and aches in the body.
                                        The bark is boiled and a very small
                                        amount is taken. It can be poisonous
                                        in an overdoes (E)
     (11) Others
                                      :
2
      Seed
```

: October in Kwa-vonza Location.

(2) (3) (4) (5) (6) (7) (8) (9) (10)	Month of collection Method of collection Method of preparation Method of storage Number of seeds per fruit Number of seeds per Kg. of Usual germination rate Provenance Others	: : : : : : : : : : : : : : : : : : : :	February in Kwa-vonxa Location. To collect fruits, or fall them on the ground by rocking or hitting by a pole, or go up to a tree and take fruits. 1. :
Seed	ling		
(1) (2) (3) (4) (5) (6)	Applied seed pretreatment Types of seedling a. Pot seedling b. Stump c. Bare root Sowing month at Tiva Nurs Growing speed in the nurs Note for watering Note for other things	: : ser	
Plan	tation		
(1)	Site condition Land Preparation	:	 (i) In 1987, total clearing, but not cut down useful trees more than 5cm in D.B.H. (ii) In 1989, 2m width slashing and 1m remaining, the same as in (i) for useful trees.
(3)	Number of seedlings per h		<pre>: (i) In 1987, 1,000 seedlings/ha planted. (ii) In 1989, 830 seedlings/ha planted.</pre>
(4)	Size of planting hole	:	(i) In 1988, 45cm x 45cm. (ii) In 1989, 65cm x 65cm.
(5)	Weeding	:	Weeding is very important, at least 2 times per year.
(6) (7) (8) (9)	Damage Growing speed Management Some data from forestation Planted Compart. Areas year ha		Fast.

(10) Some data from extension: The farmers in the Kwa-vonza Location like this tree for timber and fuelwood.

30

30.0

29.9

56

(11) Others

1987

1989

3

4

0.68

0.48

D-1-3

```
Species: Moringa stenopetala
Cf. A:187, B:100, C:-, D:68, E:-, F:-, G:-, H:-, I:-
      Basic data
1
                               : Moringaceae
           Family name
      (1)
                               : Mzunze, Mrongo(Swahili), Murunda(Kamba),
           Vernacular name
      (2)
                                 Horse-radish tree, Drumstock tree(English).
                               : Indigenous
      (3)
           Origin
      (4)
           Climatic condition
                Preferred climatic type(B):
                                                                           Alt.
                                                              Temp.
                                                    Evap.
                                       Prec.
                   Climatic type
      Zone
                                                                         0 - 1200
                                                              22 - 30
                                                  1650-2300
                                      450- 900
                  Taveta/Isiolo
      V, 1-2
                                                                         0 - 1200
                                                              22 - 30
                                                  1900-2400
                                      300- 550
      VI, 1-2
                  Magadi/Garba Tula
                                                                         0 - 1200
                                                              22 - 30
                                                  2100-2500
                                      150- 350
                  Wajir
      VII, 1-2
                          Average annual rain fall, mm
            Note; Prec.
                          Average annual potential evaporation, mm
                   Evap.
                          Mean annual temperature, (deg.C)
                   Temp.
                   Alt.
                          Altitude, m
                                                  : No data
                 Climate adaptability(D)
                                                  : No data
                 Preferable ecological zone (H)
             С.
                 Environmental requirements(G)
                                                  : No data
             d.
                                                  : No data
                 Site requirements(I)
                                      : Common near Isiolo and on the island at
       (5)
           Distribution in Kenya
                                        Lake Baringo(A).
            Soil Characteristics
       (6)
            Shade tolerance
       (7)
                                      : 10 m(A)
       (8)
            Mature tree's height
            Mature tree's diameter
       (9)
            Utilization
                                      : The species is able to use as live
      (10)
                                        fence, food (leaves and pods) and
                                        spice(B). Modern research suggests that
                                        this species may be an even more
                                        efficient water purifier(A).
      (11) Others
2
       Seed
            Month of flowering
       (1)
            Month of collection
       (2)
       (3)
            Method of collection
       (4)
            Method of preparation
       (5)
            Method of storage
       (6)
            Number of seeds per fruit:
            Number of seeds per Kg. or 1.:
       (7)
       (8)
            Usual germination rate
                                      : Germination is high(B).
       (9)
            Provenance
            Others
      (10)
                                      : Seeds are large, 5 cm long and 2 cm
```

wide, also triangular with wings(B).

Seedling 3

- (1) Applied seed pretreatment: Direct sowing in pots is appropriate(B).
- Types of seedling

a. Pot seedling : Operational b. Stump : Not examined c. Bare root : Not examined

- Sowing month at Tiva Nursery :
- (4)Growing speed in the nursery :
- : Avoid too much watering. Note for watering (5)
- Note for other things (6)

Plantation 4

(1)Site condition

: In 1988, strip clearing, 1m width (2) Land Preparation slashing and 2m remaining but not cut down useful trees more than 5cm in D.B.H.

: In 1988, 1,000 seedlings/ha Number of seedlings per ha (3)planted.

: In 1988, 45cm x 45cm Size of planting hole (4)

: Weeding is very important, at least Weeding (5)2 times per year.

(6)Damage (7)Growing speed

Management (8)

Some data from forestation site (9)Height Survival rate Compart. Areas Planted Jul.89 Nov.89 Oct.90 Oct.91 Oct.90 Oct.91 year % CM % % % ha 25 14.2 74.5 0.51 I - K1988

- Some data from extension (10)
- (11) Others

Species: Parkinsonia aculeata

Cf. A:61, B:104, C:-, D:71, 144, 218, E:-, F:-, G:140, H:-, I:343

Basic data 1

: Caesalpinaceae Family name (1)

Vernacular name : Jerusalem thorn(English) (2)

: Tropical and sub-tropical America (3)Origin

Climatic condition (4)

Zone V, 1-2 V, 3 VI, 1-2 VI, 3 VII, 1-2	Preferred climatic Climatic type Taveta/Isiolo Kajiado(part) Magadi/Garba Tula Kirimun(pan Wajir	Prec. 450- 900 450- 900	Evap. 1650-2300 1650-2300 1900-2400 1900-2400 2100-2500	Temp. 22-30 20-22 22-30 20-22 22-30	Alt. 0-1200 1200-1800 0-1200 1200-1800 0-1200
--	--	-------------------------------	--	-------------------------------------	--

Note; Prec. Average annual rain fall, mm

Evap. Average annual potential evaporation, mm

Temp. Mean annual temperature, (deg.C)

Alt. Altitude, m

b. Zone	Climate adap Prec. Dry	Dry per	D) : iod No. of DP	Mean	Temperatu Lowest	re Hi <mark>g</mark> hest
Semi-arid, hot	250-600	8-10	1 or 2	>18		
Semi-arid, warm to cold Arid, hot desert	250-600 <250	8-10 11-12	1 or 2 1	<18 >18		
Highland sub- humid	500-1200	2-6	1		-3 <t<18< td=""><td>>10</td></t<18<>	>10

Note; Prec. Average annual rainfall, mm Dry months: Total number of dry months (<50 mm) per year No of DP: Number of dry period per year

- c. Preferable ecological zone (H) : No data
- d. Environmental requirements(G):

Temperature: It grows in tropical and sub-tropical climate. It withstands high temperature (for example, up to 36 deg. C) and light frosts. For best growth it requires full sun.

: It is generally found at altitude below 1,300 m. Altitude

: The tree grows well where annual rainfall is as high as Rainfall 1,000 mm, but its greatest potential is in dry area receiving as little as 200 mm annually and having dry seasons as long as 9 months.

: This species occurs naturally in poor, gravelly, or sandy Soil alluveal soil in desert grassland and canyon. It

tolerates saline site, but grows poorly in soils subject

to water-logging.

Site requirements(I): Poor gravelly or sandy-soils. Moderately sald-tolerant. Is not water-log. Grows under 200-1,000 mm of precipitation. Survives light frost. Distribution in Kenya : Widely planted in poor or sandy soil at lower altitudes(A). Well established in drier places in Kenya already(B). Soil characteristics : Sand and loam in soil texture, alkaline (pH > 7.5) in reaction, well drained in drainage, salinity(D). : Shade intolerant, in shaded sites, Shade tolerance its growth is retarded(G). Mature tree's height : 6 m. Growing to 10 m(G). Mature tree's diameter : Up to 40 cm (G). Utilization : Fuelwood/charcoal, ornamental, local medicine, bee-forage, live-fencing, mulching, hedgerow, fodder(D). Others : Nitrogen-fixation, drought resistant. Seed Month of flowering : March to October in Kibwezi, Tiva. Month of collection : To collect pods under a tree, or fall Method of collection tham on the ground by rocking or hitting by pole then collect. : After dry pods, then put them into a Method of preparation sack and hit by a pole. : Seeds remain viable in storage for long Method of storage periods(B). Number of seeds per pod Number of seeds per Kg. or 1. : 7,500 - 13,000 seeds/kg.(D) : 30 - 70%(D). Usual germination rate Provenance : Others Seedling (1) Applied seed pretreatment: Immerse in boiling for 3 minutes, allow to cool, soak in cool/tepid water for 36 hours(D)(I). Types of seedling : Operational a. Pot seedling : Not examined b. Stump : Not examined c. Bare root : April to June Sowing month at Tiva Nursery Growing speed in the nursery : Fast : Care should be taken not to over-water Note for watering as damping off is problem(B). : Roots must be cut back(I).

(5)

(6)

(7)

(8)

(9)

(10)

(11)

(1)

(2)

(3)

(4)

(5)

(6)

(7)

(8)

(9)

(2)

(3)

(4)

(5)

(6)

Note for other things

(10)

2

3

Root and shoot cuttings and air-layers

have been successfully tried(I).

Plantation

(1) (2)	/i) In 1987. TOTAL CIE	aring,	but no	t cut
(4)	down useful trees mor	e than b	cm in	D.B.H
	(ii) In 1988, 1m widt	th slash	for u	nu zw seful
	remaining, the same a	S III (I)	TOT U	SCIUI
	trees. (iii) In 1989, 2m wid	th slas	hing a	nd 1m
	remaining, the same a	s in (i)	for u	seful
	trees.			
(3)	3) Number of seedlings per ha : (i) In 1987, 1	,000 se	edling	gs/ha
(0)	planted.			
	(ii) In 1988,	1,000 se	ealin	gs/na
	planted. (iii) In 1989,	830 se	edlin	gs/ha
	planted.	000 50		5-7
(1)	(4) Size of planting hole : (i) In 1987, 45cm x	45cm		
(4)	(ii) In 1988, 45cm	45cm		
	(iii) In 1989, 65cm	x 65cm.		
(5)	(5) Weeding : Weeding is very impo	ortant,	at le	ast imes
	2 times per year, if (6) Damage : Young plants are dan	possib.	res c	IMCS.
(6)	(6) Damage : Young plants are dan termites(G).	maged by		
(7)				
(8)		ole(D).		
(9)	(9) Some data from forestation site			
	Planted Compart. Areas Survival ra	te		ight
	year Jul.89 Nov.89 Oct.90 Oc			ct.91
	ha % % % 1987 1.98	%	cm	CIII
	1987 1.98 1988 II-F-1 3.00 70.5 27.0 -	_	_	-
	1989 E-1-3(L) 0.54 20.0	5.0	24	68
	Note (L): Hole size is 65cm x 65cm			

- (10) Some data from extension
- (11) Others

Species: Prosopis juliflora

Cf. A:, B:108, C:197, D:75, 145, 222, E:-, F:-, G:152, H:-, I:357

1 Basic data

(1) Family name : Mimosoaceae

(2) Vernacular name : -

(3) Origin : South-western U.S. and Mexico(B).

(4) Climatic condition

a. Preferred climatic type(B) : No data

b. Climate adaptability(D)

Zone	Prec.	Dry p	period		Temperature			
Sub-humid Semi-arid, hot Arid, hot	600-1500 250- 600	Dry months 4-8 8-10	No. of DP 1 1 or 2	Mean	Lowest >18	Highest		
desert Arid,warm to	<250	11-12	1	>18				
cold	<250	11-12	1	18				

Note; Prec. Average annual rainfall, mm

Dry months: Total number of dry months (<50~mm) per year

No of DP: Number of dry period per year

c. Preferable ecological zone (H) : No data

d. Environmental requirements(G)

Temperature: This species grows in very warm, dry climates. Some

varieties are not frost hardy.

Altitude : The tree is found growing from sea level to 1,500 m.

The plant's roots penetrate to great depths in search

of soil moisture.

Soil : The tree grows on variety of soils. It does well on

sandy soil and will grown on rocky terrain provided that

root growth is not impeded.

rooting habit. Tolerates extreme head;
150 - 700mm precipitation, 0 - 1,500m
altitude. Sandy and rocky soils as long
as root-growth is not impeded by crusts.
Not on insufficiently drained sites;
very suitable for dunes; tolerates salt
and nutrient - poor soils.

(5) Distribution in Kenya : This species is wide

: This species is widely planted in Kenya

from the coast to Turkana(B).

(6) Soil characteristics : Sandy soil, neutral(pH 6.5 - 7.5) or

alkaline (pH > 7.5) in reaction, seasonal or permanent water logging in

drainage(D).

(7) Shade tolerance : Very weak for shade

(8) Mature tree's height : This tree may grow to 10 m more,

depending on the variety and site(G).

(9) Mature tree's diameter

: Fodder, bee-forage, carvings/turnery, (10) Utilization fuelwood/charcoal, poles/posts and timber(D). : Nitrogen-fixation(D).

(11) Others Special care is required concerning the provenance of seed(I). There is a risk of uncontrolled spread(I). Direct seeding is recommended, but

requires weeding.

2 Seed

: August in Kyuso. Month of flowering (1) : February in Kyuso. Month of collection (2)

: To collect pods under a tree, or fall (3) Method of collection them on the ground by rocking or hitting by a pole then collect them.

(4) Method of preparation Method of storage (5): Number of seeds per pod (6)

Number of seeds per Kg. or 1. : 8,000 - 30,000 seeds/kg.(D) (7)

: 40 - 80%(D). Usual germination rate

Provenance (9)(10)Others

3 Seedling

(1) Applied seed pretreatment: Soak in cold/tepid water for 48 hours, or immerse in boiling water, allow to cool.(D) The seeds must be mechanically scarified and either treated with 20% sulfuric acid for 1 hour, or soaked in concentrated sulfiric acid for about 20 minutes, or covered with boiling water and allowed to cool and soak for

24 hours(G). (2)

Types of seedling : Operational a. Pot seedling : Not examined b. Stump : Not examined c. Bare root

Sowing month at Tiva Nursery : March to May (3)

Growing speed in the nursery : Fast (4)

: Avoid too much watering. Note for watering (5): Cutting (2 years old plant) (6)Note for other things available(I).

4 Plantation

Site condition (1)

: (i) In 1986, total clearing, but not cut (2)Land Preparation down useful trees more than 5cm in D.B.H (ii) In 1987, total clearing, the same as in (i) for useful trees. (iii) In 1988, strip clearing, 1m width

slashing and 2m remaining, the same as in (i) for useful trees.

(iv) In 1989, strip clearing, 1m width slashing and 2m remaining, the same as in (i) for useful trees. Number of seedlings per ha : (i) In 1986, 1,000 seedlings/ha planted. (ii) In 1987, 1,000 seedlings/ha planted. (iii) In 1988, 1,000 seedlings/ha planted. (iv) In 1989, 830 seedlings/ha planted. (4)Size of planting hole : (i) In 1986, 45cm x 45cm. (ii) In 1987, 45cm x 54cm. (iii) In 1988, 45cm x 45cm. (iv) In 1989, partly 65cm x 65cm. : Weeding is very important, at least (5)Weeding 2 times per year, if possible 3 times. (6)Damage (7)Growing speed : Fast : Possible of coppicing, lopping, (8)Management pollarding and pruning(D). Some data from forestation site (9)Height Survival rate Compart. Areas Planted Jul.89 Nov.89 Oct.90 Oct.91 Oct.90 Oct.91 year % % % ha 0.83* 1986 0.42 1987 233 39.0 33.5 167 2.51 68.0 2.93 Sub-total 22 16.5 74.0 31.0 1.42 I-J-31988 60 29.5 46 63.0 50.0 3.27 86.0 I - M56.5 92 114 89.5 71.0 67.5 3.76 II-E-239 41 35.0 82.5 65.5 44.5 I I-H-1 3.85 12.30 Sub-total 28 41 10.0 18.0 A-1-4(L) 0.80 1989 26 8.0 8 39.0 B - 2 - 40.47 7 4.7 11 53.3 B-3-4(SW) 0.1416 2.6 9 36.1 D-4-5(SW) 0.4546 86 45.0 61.0 F-2-2(Tr) 0.39

> Note: According to survey on March 1990, 273 trees in 0.54Ha are surviving, average height is 173 cm, average base diameter is 3 cm.

40

7

13.0

38.1

:(L): hole size is $65cm \times 65cm$; (S): hole size is 25 x 25cm;

(SW): Spotweeding; (Tr): Turkana method.

(10) Some data from extension

Sub-total

Taxonomy of the genus Prosopis is confused. The name juliflora Others (11)

0.05

2.30

F-4-4(S)

has been used in the past to describe species native to Texas and nearby states. These are now known as P. glandulase and

 \underline{P} . $\underline{velutina}$. Plants that were distributed around the world under the name \underline{P} . $\underline{juliflora}$ are probably mislabeled in many cases(G). There are many closely related prosopis species, such as \underline{P} . $\underline{chilensis}$, \underline{P} . $\underline{glandulosa}$ and \underline{P} . $\underline{velutina}$, which have also been introduced into the semi-arid area of Africa and are now occasionally taken as \underline{P} . $\underline{juliflora}$. They have, however, slightly differing sight requirements and their use potential may be different. The species \underline{P} . $\underline{juliflora}$ in itself has a great number of forms and varieties(I).

Species: Schinus molle

Cf. A:7, B:-, C:-, D:82, 229, E:-, F:-, G:-, H:8, I:-

1 Basic data

(1) Family name : Anacardiaceae

(2) Vernacular name : Pepper tree(English)

(3) Origin : Peru, Andes

(4) Climatic condition

a. Preferred climatic type(B) : No data.

b. Climate adaptability(D)

		*	FG 23			
Zone	Prec. Dry period			"⇔mperature		
		Dry months	No. of DP	Mean	Lowest	Highest
Semi-arid, hot	250-600	8-10	1 or 2	>18		
Semi-arid, warm						
to cold	250-600	8-10	1 or 2	<18		
Arid, warm to						
cold	<250 1	1-12	1	<18		
Highland sub-						
humid	500-1200	2-6	1		-3(t.18	>10

Note; Prec. Average annual rainfall, mm

Dry months: Total number of dry months (50 mm) per year

No of DP: Number of dry period per year

c. Preferable ecological zone (H) :

Eco-Zone	Rainfall(mm)	Altitude(m)	Soil type	Rotation
III Highland	800-1,400	1,500-3,000	Variable red to	Short
	50 St. 16 St. 50 St. 15 St. 16		cotton loany soils	(10-
				20 yrs)

d. Environmental requirements(G) : No datae. Site requirements(I) : No data

- (5) Distribution in Kenya: Commonly planted in dry, warm climates in many parts of the world as well as most districts of Kenya(A).
- (6) Soil characteristics : Very tolerant of most soils, including both black cotton and drys andy soil(A).
- (7) Shade tolerance
- (8) Mature tree's height : 10 15 m(A)
- (9) Mature tree's diameter
- (10) Utilization : Cosmetic/hyginic, ornamental, gum, fuelwood/charcoal, bee-forage, food-spice, live fencing, shade and shelter,

fence posts(D).

(11) Others : Extremely drough-resistant once established and reaching maturity in less than 20 years(A).

2 Seed

- (1) Month of flowering
- (2) Month of collection

- (3) Method of collection Method of preparation (4)Method of storage (5)Number of seeds per fruit: Number of seeds per Kg. or 1. : 14,000 - 44,000 seeds/kg.(D) (6)(7)Usual germination rate : (8): Provenance (9): Others (10)Seedling 3 Applied seed pretreatment: Types of seedling (2) : Operational a. Pot seedling : Not examined b. Stump : Not examined c. Bare root Sowing month at Tiva Nursery : June to July (3)Growing speed in the nursery : Fast growing(A) (5) Note for watering : Avoid too much watering. (6) Note for other things Plantation 4 (1) Site condition : In 1988, strip clearing, 1m width (2) Land Preparation slashing and 2m remaining, but not cut down useful trees more than 5cm in D.B.H. : In 1988, 1,000 seedlings/ha (3) Number of seedlings per ha planted. : In 1988, 45cm x 45cm (4) Size of planting hole : Weeding is very important, at least (5) Weeding 2 times per year. Damage (6): Fast(A). (7)Growing speed (8)Management (9) Some data from forestation site Survival rate Planted Compart. Areas Jul.89 Nov.89 Oct.90 Oct.91 Oct.90 Oct.91 year % % cm % % ha 8.5 1988 0.98 61.0 I-G
 - (10) Some data from extension
 - (11) Others

Species: Sesbania grandiflora

Cf. A:-, B:-, C:201, D:83, 147, 231, E:-, F:-, G:62, H:-, I:-

1 Basic data

(1)Family name : Papilionaceae

(2)Vernacular name

(3)Origin : Tropical Asia

(4)Climatic condition

Preferred climatic type(B) : No data

Climate adaptability(D)

	O. CI	imace adap	capitite (D)	•			
Zone		Prec.	Dry p	Dry period			ature
			Dry months	No. of DP	Mean	Lowest	Highest
Permanently	humid	>1500	-	None		>18	
Monsoonal		>1500	< 4	1		>18	
Sub-humid		600-1500	4-8	1		>18	
Semi-arid		250- 600	8-10	1 or 2			

Average annual rainfall, mm Dry months: Total number of dry months (<50 mm) per year No of DP: Number of dry period per year

- Preferable ecological zone (H) : No data
- Environmental requirements(G)

Temperature: The tree is frost sensitive and is adapted only to tropical conditions.

: Grows up to 800 m above sea level. Altitude

: This species grows best where annual rainfall exceeds Rainfall 1,000 mm and there are only a few months of dry season. It is widely grown in areas where there is extensive irrigation or flooding, such as in Asian rice paddies. On the other hand, the species grows abundantly on semi-

arid Tomor Island of Indonesia.

: The species is able to grow in wide range of soils, even Soil poor ones, including black, poorly structured clay. Its extraordinary nodulation undoubtedly helps restore fertility to those soils. This, coupled with its rapid growth suggests that its soil improvement qualities though unmeasured - may be exceptional.

Site requirements(I): No data

- (5) Distribution in Kenya
- : Sand, loam in soil texture, Soil Characteristics (6)

acid(pH < 6.5), neutral(pH: 6.5 - 7.5), in reaction, seasonal logging in

drainage(D).

- Shade tolerance (7)
- Mature tree's height (8)
- Mature tree's diameter (9)
- Utilization (10)

: 10 m(C)

: Pulpwood, fodder, food (flower, leaves, young pods), ornamental, fuelwood/ charcoal, short fibre pulp, green manure, gum, tannins(D).

103

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: Nitrogen-fixation.
    (11) Others
     Seed
2
                                   : April in Matinyani.
     (1) Month of flowering
                                   : August in Matinyani.
     (2) Month of collection
                                   : To collect pods, or fall them on the
     (3) Method of collection
                                     ground by rocking or hitting by pole
                                     then collect, or go up a tree and
                                     take pods.
                                   : After drying the pods, then put them
      (4) Method of preparation
                                     into a sack and hit by a pole.
      (5) Method of storage
      (6) Number of seeds per pod :
      (7) Number of seeds per kg. or 1. : 17,000 - 20,000 seeds/kg.(D)
      (8) Usual germination rate : 85 - 90%(D)
      (9) Provenance
     (10) Others
3
      Seedling
      (1) Applied seed pretreatment:
      (2) Types of seedling
           a. Pot seedling : Operational
                                   : Not examined
           b. Stump
                                   : Not examined
           c. Bare root
           Sowing month at Tiva Nursery : May to August
       (3)
       (4) Growing speed in the nursery : Fast.
       (5) Note for watering : Avoid too much watering.
       (6) Note for other things
      Plantation
 4
       (1) Site condition
       (2) Land Preparation
       (3) Number of seedlings per ha
       (4) Size of planting hole
       (5)
           Weeding
            Damage
       (6)
                                   : Fast(C).
            Growing speed
       (7)
                                   : Coppicing and lopping are available(D).
       (8)
            Management
           Some data from forestation site: Not planted in the Pilot Forest.
       (9)
            Some data from extension
      (10)
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(11) Others

Species: Sesbania sesban

Cf. A:225, B:111, C:-, D:83, 147, 231, E:142, F:130, G:-. H:6, 8, I:-

1 Basic data

- (1) Family name : Paiplionaceae
- (2) Vernacular name : Mwethia(Kikuyu), Munyongo(Kamba)

Sesbania, River beans(English)(A, B).

- (3): Indigenous Origin
- (4) Climatic condition

•	Preferred	alimatia	+ 11700 / D \	
a.	rrererred	CITHALIC	Lyberbi	

	riordried crimatic	UJPC(D)			
Zone	Climatic type	Prec.	Evap.	Temp.	Alt.
I, 3-4	Kakamega	1100-1700	1200-2000	18-22	1200-1850
II, 1	Ramisi	1000-1600	1300-2100	24-30	0- 900
II, 2-3	Migori	1000-1600	1300-2100	20-24	900-1800
II, 4	Limuru(part)	1000-1600	1300-2100	18-20	1500-1850
III, 1	Kwale	800-1400	1450-2200	24-30	0- 900
III, 2-3	Kisumu/Murang'a	800-1400	1450-2200	20-24	900-1800
III, 4-5	Nairobi	800-1400	1450-2200	16-20	1500-2150
IV, 1	Lamu	600-1100	1550-2200	24-30	0- 900
IV, 2-3	Lake Victoria/Thika	600-1100	1550-2200	20 - 24	900-1800
IV, 2-3	Rumuruti/Narok(part)	A STATE OF THE PARTY OF THE PAR	1550-2200	18-20	1500-1850
1 4 4 4	Rumur uci/ Marok (par c)	000 1100			

Note; Prec. Average annual rain fall, mm

Evap. Average annual potential evaporation, mm

Temp. Mean annual temperature, (deg,C)

Altitude, m Alt.

b. Climate adaptability(D) :

	Prec. Dry period					Temperature		
Zone	riec.	Dry months No. of DP		Mean	Lowest	Highest		
Permanently humid	>1500	_	None		>18			
		2-6	1		-3 <t<18< td=""><td>>10</td></t<18<>	>10		

Average annual rainfall, mm Note; Prec. Dry months: Total number of dry months (<50 mm) per year No of DP: Number of dry period per year

Preferable ecological zone (H):

Eco-Zone	Rainfall(mm) Over 1,400	Altitude(m) 1,400-2,500	Soil type Variable soils	Rotation Short (2-3yrs)
III Highla	and 800-1,400	1,400-2,500	Variable soils	Short (2-3yrs)

- Environmental requirements(G) : No data : No data Site requirements(I)
- : Widely distributed from 1,300 to (5) Distribution in Kenya 2,000 m, often along rivers or in

swampy ground(A).

: Loam, clay in soil texture, acid(pH<6.5) (6) Soil characteristics neutral(pH: 6.5 - 7.5) in reaction, 105

seasonal logging, well drained in drainage, salinity(D). (7) Shade tolerance : 8 m near water(A) Mature tree's height (8) (9) Mature tree's diameter Fodder, fuelwood/charcoal, fibres, (10) Utilization medicinal, support(D). Used as a medicine for increasing milk in cows. The leaves are made into paste, and diluted with water, and the cow is forced to take this mixture a few days after delivery. For treatment of swollen parts of the body, grind up the leaves, and apply. Ground leaves are used for stomach trouble(E). : Nitrogen-fixation. (11) Others This species is one of a few Kenyan trees already being used as an agroforestry tree(B). 2 Seed : May in Tiva Month of flowering (1): October in Tiva Month of collection (2): To stand on the ladder or something Method of collection (3)like that, then drow the branch carefully by stock with hook and take pods. : Damaged seed is often found in the pod, (4) Method of preparation necessitating sorting and cleaning(B). : When kept dry and cool, the seed has Method of storage (5)long viability(B). Number of seeds per pod (6)Number of seeds per Kg. or 1.: (7)(8)Usual germination rate : Provenance (9)(10)Others Seedling 3 Applied seed pretreatment: (1)Types of seedling (2): Operational a. Pot seedling : Not examined b. Stump : Not examined c. Bare root Sowing month at Tiva Nursery : July to August (3)Growing speed in the nursery : Fast. (4): Avoid too much watering. Note for watering (5)Note for other things (6)Plantation (1) Site condition : In 1987, total clearing, but not cut (2) Land Preparation down useful trees more than 5cm in D.B.H.

(3) Number of seedlings per ha : In 1987, 1,000 seedlings/ha planted.

(4) Size of planting hole: In 1987, 45cm x 45cm

(5) Weeding : Weeding is very important, at least

2 times per year.

(6) Damage

(7) Growing speed : Very fast growing(A,B)

(8) Management : Coppicing, lopping and pollading are

available(D).

Because of its quick germination and fast growth it is best to plant this species directly in the field rather

than in a nursery(B).

(9) Some data from forestation site

Planted Compart. Areas Survival rate Height
year Jul.89 Nov.89 Oct.90 Oct.91 Oct.90 Oct.91
ha % % % cm cm
1987 1.55 - - - - -

- (10) Some data from extension
- (11) Others

Species: Tamarindus indica

Cf. A:63, B:112, C:203, D:85, 148, 234, E:123, F:-, G:-, H:12, I:383

1 Basic data

(1) Family name : Caesalpinaceae

(2) Vernacular name : Muthithi(Meru), Kithamula(Kamba), Mkwaju(Swahili), Tamarind(English).

(3) Origin : Indigenous,

Madagascar, East Africa(I).

(4) Climatic condition

a.	Preferred climatic	type(B):			
Zone	Climatic type	Prec.	Evap.	Temp.	Alt.
III, 1	Kwale	800-1400	1450-2200	24 - 30	0- 900
III, 2-3	Kisumu/Murang'a	800-1400	1450-2200	20-24	900-1800
IV, 1	Lamu	600-1100	1550-2200	24 - 30	0- 900
IV, 2-3	Lake Victoria/Thika	600-1100	1550-2200	20-24	900-1800
V, 1-2	Taveta/Isiolo	450- 900	1650-2300	22-30	0-1200
V, 3	Kajiado(part)	450- 900	1650-2300	20-22	1200-1800
VÍ, 1-2	Magadi/Garba Tula	300- 550	1900-2400	22-30	0-1200
VI, 3	Kirimun(part)	300- 550	1900-2400	20-22	1200-1800
VII, 1-2	Wajir	150- 350	2100-2500	22-30	0-1200

Note; Prec. Average annual rain fall, mm

Evap. Average annual potential evaporation, mm

Temp. Mean annual temperature, (deg.C)

Alt. Altitude, m

b. Climate adaptability(D) :

			CILIMACC	addition (D	, .				
Zone Pre			Prec.	Dry period			Temperature		
				Dry months	No. of DP	Mean	Lowest	Highest	
	Mosoonal		>1500	< 4	1		>18	_	
	Sub-humid		600-1500	4-8	1		>18		
	Semi-arid,	hot	250- 600	8-10	1 or 2	>18			
	Semi-arid,	warm							
	to cold		250- 600	8-10	1 or 2	18			
	Humid sub-					1970-700			
	tropics		>1200	-	None		-3 <t<18< td=""><td>>22</td></t<18<>	>22	
	Temperate						0.0.10	, 55	
	maritime		>1200	_	None		-3 <t<18< td=""><td>10-22</td></t<18<>	10-22	
							0.0.10	10 22	

Note; Prec. Average annual rainfall, mm

Dry months: Total number of dry months (<50 mm) per year

No of DP: Number of dry period per year

c. Preferable ecological zone (H):

Eco-Zone Rainfall(mm) Altitude(m) Soil type Rotation

IV 400-800 1,000-1,400 Sandy to sandy-clay soils to riverine clay/sandy soils.

Environmental requirements(G): No data d.

Site requirements(I): e.

The wide distribution of Tamarindus shows that it is a very adaptable species. Grows preferably in semiarid regions (with approximately 400 mm annual precipitation), but also in the monsoon region with more than 1,500 mm. No particular soil requirements, but has preference for deep alluvial soils. A slight salinity is tolerated. pH should be about 5.5 (I).

(5)Distribution in Kenya

: Widely distributed in drier grassland

(6) Soil Characteristics

from coast to 1,500 m(A). : Loam to sand in soil texture,

acid(pH < 6.5) in reaction, well

drained in drainage(D).

(7)Shade tolerance

: Tolerance.

(8) Mature tree's height

: 25m.

Mature tree's diameter (9)

Utilization (10)

: Very valuable tree of the drier regions(B), used for fuelwood/charcoal,

industrial timber, poles, shade/

ornamental, food fruits.

(11)Others

: Develops long and deep roots(A).

2 Seed

(1)Month of flowering : January in Kitui East and Zombe.

(2)Month of collection

: August in Kitui East and Zombe.

(3) Method of collection

: To collect, fruits, or fall them on the ground by rocking or hitting a pole then collect, or go up to a tree

and take fruits.

(4) Method of preparation

: Put fruits into a vessel with water and sand, wash with hand, then wash seeds with water and dry in shadow for one week.

(5) Method of storage

: They store well, remaining viable for more than two years if protected from

insect attack(B).

Keep in (a tin with charcoal) a cotton sack in dark room or well heated place.

(6)Number of seeds per pod

(7)Number of seeds per Kg. or 1.: 700 - 2600 seeds/kg.(D), 3,000

seeds/kg.(D).

(8)Usual germination rate : 30 - 70%(D), 90%(B)

(9)Provenance

(10)Others

:

Seedling 3

(1) Applied seed pretreatment: Soak in cold/tepid water for 24 hours or 48 hours, soak in hot water for 24 hours.(D)

- (2) Types of seedling
 - a. Pot seedlingb. Stumpc. Operationald. Not examined
 - c. Bare root : Not examined
- (3) Sowing month at Tiva Nursery : February to March
- (4) Growing speed in the nursery : Slow
- (5) Note for watering : Avoid too much watering.
- (6) Note for other things : As soon as the cotyledons break

through, planst must be shaded until they reach a hight of 35cm. Seedlings should attain at least 80cm before being transplanted to their final location at the beginning of the rainy

season(I).

4 Plantation

- (1) Site condition
- (2) Land Preparation : (i) In 1986, total clearing, but not cut down useful trees more than 5cm in D.B.H

(ii) In 1987, total clearing, the same

as in (i) for useful trees.

(iii) In 1988, strip clearing, 1m width slashing and 2m remaining, the same as

in (i) for useful trees.

(iv) In 1989, strip clearing, 2m width slashing and 1m remaining, the same as in (i) for useful trees.

(3) Number of seedlings per ha

: (i) In 1986, 1,000 seedlings/ha

planted.

(ii) In 1987, 1,000 seedlings/ha

planted.

(iii) In 1988, 1,000 seedlings/ha

planted.

(iv) In 1989, 830 seedlings/haplanted.

- (4) Size of planting hole
- : (i) In 1986, 45cm x 45cm.
 - (ii) In 1987, 45cm x 45cm.
 - (iii) In 1988, 45cm x 45cm.
 - (iv) In 1989, partly 65cm x 65cm.

(5) Weeding

: Weeding is required. 2 times per year.

(6) Damage

- :
- (7) Growing speed
- : Very slow.
- (8) Management
- : Possible of coppicing(D).

(9)Some data from forestation site Planted Compart. Areas Survival rate Height year Jul. Nov. Oct. Oct. Oct. Oct. 89 91 89 90 90 91 ha % % % Cm cm 1986 0.91* 1987 0.88 5.12 40.5 18.0 20 Sub-total 6.00 I-E-2 1988 3.92 84.5 27 65.0 48.5 46.5 15 I-H 2.05 80.0 52.0 36.5 16.0 13 18 I-K 0.92 39.0 73.0 52.0 12 18 50.5 II-A 4.99 82.5 55.5 61.5 57.5 13 14 21 21 II-H-3 1.02 64.5 73.0 88.5 69.5 2.75 23 24 II-H-4 94.5 79.5 83.5 80.0 Sub-total 15.66(86.0)(65.4) 61.0 251 14 1989 A-1-5(L)0.30 79.0 27.0 12 13 69.0 B - 2 - 50.69 19 91.7 17 B-3-5(SW) 0.0995.4 17 85.9 48.9 15 D-4-1(SW) 0.2725 79.0 20 93.5 0.71 E-2-1(L)22 17 40.0 F-4-5(S)0.05 71.0

2.11

- * Note: According to the survey on March 1990, 330 trees in 0.63 ha are surviving, average height is 102cm and average base diameter is 2.4cm.
 (L): Hole size is 65cm x 65cm.
 - (S): Hole size is 25cm x 25cm. (SW): Spotweeding.
- (10) Some data from extension

Sub-total

(11) Others: When establishing pure plantation, spacing should be at least $13m \times 13m(I)$.

Species: <u>Terminalia</u> <u>brownii</u>

Cf. A:79, B:114, C:-, D:87, 235, E:57, F:-, G:-, H:10, I:-

1 Basic data

- (1) Family name : Combretaceae
- (2) Vernacular name : Muhutu, Muuku(Kamba), Manera, Onera(Luo),

Mbarao(Swahili).

- (3) Origin : Indigenous
- (4) Climatic condition

a.	Preferred climatic	type(B) :			
Zone	Climatic type	Prec.	Evap.	Temp.	Alt.
III, 1	Kwale	800-1400	1450-2200	24 - 30	0- 900
III, 2-3	Kisumu/Murang'a	800-1400	1450-2200	20-24	900-1800
San Company of the Co		600-1100	1550-2200	24-30	0- 900
IV, 1	Lamu		1550-2200	20-24	900-1800
IV, 2-3	Lake Victoria/Thika	450- 900	1650-2300	22-30	0-1200
V, 1-2	Taveta/Isiolo	450- 900	1650-2300	20-22	1200-1800
V, 3	Kajiado(part)				0-1200
VI, 1-2	Magadi/Garba Tula		1900-2400	22-30	
VI, 3	Kirimun(part)	300- 550	1900-2400	20-22	1200-1800

Note; Prec. Average annual rain fall, mm

Evap. Average annual potential evaporation, mm

Temp. Mean annual temperature, (deg.C)

Alt. Altitude, m

- b. Climate adaptability(D) : No data
- c. Preferable ecological zone (H):
 Eco-Zone Rainfall(mm) Altitude(m) Soil type Rotation
 III Lowland 800-1,400 0-1,400 Sandy to sandy/clay Short soils.
 - d. Environmental requirements(G) : No datae. Site requirements(I) : No data
- (5) Distribution in Kenya : Widely distributed in drier wooded savannah from 700 to 2,000 m, often near rivers in very dry areas, also planted in Nairobi city as a shade tree(A).
- (6) Soil Characteristics :
- (7) Shade tolerance
- (8) Mature tree's height : Usually 4 to 5 m in height but occasionally reach 25 m(A).
- (9) Mature tree's diameter
- (10) Utilization : Fuelwood/charcoal, fodder, wood for

conversion into various products(D). The phloem are chewed and solution swallowed in the treatment of yellow

fever particularly in children.

(11) Others : This species is both drought and

termite-resistant(A).

2 Seed (1)Month of flowering : January in Kitui Month of collection (2): April in Kitui (3)Method of collection : To collect, fruits are fallen on the ground by rocking or hitting by a pole then collected, or go up to a tree and take fruits. (4)Method of preparation : Dry seeds. (5)Method of storage : Keep seeds into plastic bags then keep in a dark place. The seeds stay indefinitely, and care should be taken to inspect all seeds for insect damage(B). (6)Number of seeds per fruit: Number of seeds per kg. or 1.: 6,340 seeds/kg.(D) (7): 30%(D), but at Tiva Nursery, germination Usual germination rate (8) rate is very low. (9)Provenance : (10) Others 3 Seedling Applied seed pretreatment: None pretreatment. (1)Types of seedling (2): Operational a. Pot seedling : Not examined b. Stump : Not examined c. Bare root Sowing month at Tiva Nursery : December to February (3)Growing speed in the nursery : Slow (4): Avoid too much watering. Note for watering : Germination is difficult(B). Note for other things (6) Plantation 4 Site condition (1): In 1989, strip clearing 2 m width (2)Land Preparation slashing and 1m remaining but not cut down useful trees more than 5 cm in D.B.H. : In 1989, 830 seedlings/ha planted. Number of seedlings per ha (3): In 1989, 65cm x 65cm Size of planting hole (4): Weeding is very important, at least Weeding (5)2 times per year. (6)Damage : Slow growth unless irrigated(B). Growing speed (7): Ropping is available. Management (8)Some data from forestation site

Note (L) : Hole size is 65cm x 65cm.

ha

0.69

Compart. Areas

D - 6 - 1

(9)

Planted vear

1989(L)

%

Height

CM

30

CM

38

Survival rate

%

Jul.89 Nov.89 Nov.90 Oct.91 Nov.90 Oct.91

%

95.0

%

95.0

- (10) Some data from extension: The farmers in Kwa-vonza Location like this tree for pole, bee-hive, fodder and shades.
- (11) Others

Species: Terminalia catappa

Cf. A:79, B:-, C:366, D:87, E:-, F:-, G:66, H:-, I:-1 Basic data (1)Family name : Combretaceae Vernacular name (2): Mkungu(Swahili), Indian almond, Bastardalmon(English). (3)Origin : Andaman Island, India, Madagascar. (4)Climatic condition Preferred climatic type(B) : No data Climate adaptability(D) : No data Preferable ecological zone (H) : No data C. Environmental requirements(G) Temperature: This species is strictly a tropical species, thriving in humid climate. : It grows best at low altitudes. Altitude : The tree needs at least 1,000 mm of annual rainfall unless Rainfall the water table is high enough for its roots to penetrate. : This species is not particular as to soil; for example, Soil though it grows well in sand or shingle, it also thrives in marl and permeable siliceous limestone. Site requirements(I): No data : Widely planted at the coast, also (5) Distribution in Kenya up-country districts such as Voi,

- : Preferring sandy soil and tolerating Soil Characteristics (6)salt(A).
- Shade tolerance (7)
- : 15 to 20 m(A, C). Mature tree's height (8)
- Mature tree's diameter (9)
- : Timber, furniture, tool, oil, tannin, (10) Utilization

Nairobi and Kisumu(A).

- ornamental, medicinal(C).
- : The tree develops an extensive root (11) Others system(A).

2 Seed

- Month of flowering (1)(2) Month of collection Method of collection (3)
- Method of preparation (4)
- Method of storage (5)
- Number of seeds per pod : (6)
- Number of seeds per kg. or 1. : 150 860 seeds/kg.(D) (7)

:

- : 30 70%(D)(8) Usual germination rate
- Provenance (9)
- (10) Others

- 3 Seedling
 - (1) Applied seed pretreatment: Soak in cold/tepid water for 48 hours(D).
 - (2) Types of seedling
 - a. Pot seedling : Operational
 b. Stump : Not examined
 c. Bare root : Not examined
 - (3) Sowing month at Tiva Nursery :
 - (4) Growing speed in the nursery :
 - (5) Note for watering : Avoid too much watering.
 - (6) Note for other things
- 4 Plantation
 - (1) Site condition
 - (2) Land Preparation : In 1989, strip clearing 2m width slashing and 1m remaining, but not cut down useful trees more than 5cm in D.B.H.
 - (3) Number of seedlings per ha : In 1989, 830 seedlings/ha planted.
 - (4) Size of planting hole : In 1989, 65cm x 65cm.
 - (5) Weeding
 - (6) Damage
 - (7) Growing speed : Fast growing(A).
 - (8) Management
 - (9) Some data from forestation site

Planted Compart. Areas Survival rate Jul. 89 Nov. 89 Nov. 90 Oct. 91 Nov. 90 Oct. 91 year % % % % ha cm CM 28.5 22 1989(L) D-1-1 0.33

Note (L): Hote size is 65cm x 65cm.

- (10) Some data from extension
- (11) Others

```
Species: Terminalia mentalis
Cf. A:81, B:-, C:-, D:-, E:-, F:-, G:-, H:-, I:-
1
      Basic data
      (1)
           Family name
                              : Combretaceae
      (2)
           Vernacular name
      (3)
           Origin
                              : Madagascar
      (4)
           Climatic condition
                Preferred climatic type(B)
                                               : No data
                                                : No data
                Climate adaptability(D)
                Preferable ecological zone (H) : No data
            d. Environmental requirements(G) : No data
                Site requirements(I)
                                                : No data
      (5)
           Distribution in Kenya
                                    : This species is widely planted as a
                                      street and shade tree around and in
                                      Nairobi and down as far as the coast(A).
      (6)
           Soil Characteristics
      (7)
           Shade tolerance
           Mature tree's height
      (8)
                                   : 10 m(A).
      (9)
           Mature tree's diameter
     (10)
           Utilization
                                    : Ornamental
     (11) Others
                                    : Drought-resistant once established(A).
2
      Seed
                                   : January in Kitui East and Zombe.
      (1)
           Month of flowering
           Month of collection
      (2)
                                   : May in Kitui and Zombe.
           Method of collection
      (3)
      (4)
           Method of preparation
      (5)
           Method of storage
           Number of seeds per fruit:
      (6)
           Number of seeds per Kg. or 1.:
      (7)
      (8)
           Usual germination rate
      (9)
           Provenance
     (10) Others
3
      Seedling
           Applied seed pretreatment:
      (1)
           Types of seedling
      (2)
                                    : Operational
           a. Pot seedling
                                    : Not examined
           b. Stump
                                    : Not examined
           c. Bare root
           Sowing month at Tiva Nursery : February to March
      (3)
           Growing speed in the nursery :
      (4)
                                : Avoid too to much watering.
           Note for watering
      (5)
           Note for other things
      (6)
```

4 Plantation

(1) Site condition :

(2) Land Preparation : In 1988, strip clearing 1m width

slashing and 2m remaining, but not cut down useful trees more than 5cm in

D.B.H

(3) Number of seedlings per ha : In 1988, 1,000 seedlings/ha

planted.

(4) Size of planting hole : In 1988, 45cm x 45cm.

(5) Weeding

(6) Damage :

(7) Growing speed : Very slow but it is said to be very

fast in good soil condition(A).

(8) Management :

(9) Some data from forestation site

Height Survival rate Planted Compart. Areas Jul.89 Nov.89 Oct.90 Oct.91 Oct.90 Oct.91 year % % % % CM CM ha 70.5 19 22 87.5 82.5 74.5 1988 1.05 I - F

(10) Some data from extension

This species is preferred by farmers as ornamental tree.

(11) Others

Species: Terminalia prunioides Cf. A:81, B:115, C:-, D:236, E:-, F:-, G:, H:-, I:-1 Basic data (1)Family name : Combretaceae (2)Vernacular name : Mwagati(Swahili), Mutau(Kamba), Purple-pod terminalia(English)(B). (3)Origin : Indigenous (4)Climatic condition Preferred climatic type(B): Zone Climatic type Alt. Prec. Temp. Evap. IV, 1 24-30 Lamu 600-1100 0-900 1550-2200 IV, 2 Lake Victoria/Thika(part)600-1100 22-24 900-1200 1550-2200 V, 1-2 Taveta/Isiolo 22 - 300 - 1200450- 900 1650-2300 VI, 1-2 Magadi/Garba Tula 330-550 22-30 0 - 12001900-2400 Note; Prec. Average annual rain fall, mm Average annual potential evaporation, mm Evap. Mean annual temperature, (deg.C) Temp. Alt. Altitude, m : No data b. Climate adaptability(D) Preferable ecological zone (H) : No data c. d. Environmental requirements(G) : No data : No data Site requirements(I) ρ. : Occurring in coastal forest and dry (5) Distribution in Kenya acacia bushland in the Taita, Tana and Lamu districts from 30 m to 1,400 m(A). Plantable soil (6)Shade tolerance (7): Usually 3 m, occasionally to 10 m. Mature tree's height (8)Mature tree's diameter (9): Timber, posts, fuelwood, ornamental(D). Utilization (10)(11)Others 2 Seed : January in Kitui East and Zombe. Month of flowering (1): May in Kitui East and Zombe. Month of collection (2)(3)Method of collection Method of preparation (4)Method of storage (5)Number of seeds per fruit: (6)Number of seeds per Kg. or 1. : (7)Usual germination rate (8): (9) Provenance : Others (10)

3 Seedling

(1) Applied seed pretreatment:

- (2) Types of seedling
 - : Operational Pot seedling : Not examined b. Stump : Not examined
 - c. Bare root
- Sowing month at Tiva Nursery : December. Growing speed in the nursery : Slow.
- : Avoid too much watering. Note for watering (5)
- (6) Note for other things

4 Plantation

- (1) Site condition
- : In 1988, strip clearing 1m width (2) Land Preparation slashing and 2m remaining, but not cut down useful trees more than 5cm in D.B.H.
- : In 1988, 1,000 seedlings/ha (3) Number of seedlings per ha planted.
- : In 1988, 45cm x 45cm. (4) Size of planting hole
- : Weeding is very important, at least (5) Weeding 2 times per year.
- (6)Damage
- (7)Growing speed
- (8)Management
- Some data from forestation site (9)Height Planted Compart. Areas Survival rate Jul.89 Nov.89 Oct.90 Oct.91 Sep.90 Oct.91 year % % CM % ha 76.0 31 38 1988 0.60 77.0 79.0 78.5 I-G
- (10) Some data from extension
- (11) Others

(9)

(10)

Provenance Others

Species: <u>Terminalia</u> <u>spinosa</u> Cf. A:81, B:115, C:-, D:-, E:57, F:-, G:-, H:-, I:-Basic data 1 (1)Family name : Combretaceae (2)Vernacular name : Mwangati (Swahili), Mutula (Kamba) (3)Origin : Indigenous Climatic condition (4)Preferred climatic type(B): Zone Climatic type Prec. Evap. Temp. Alt. IV, 1 Lamu 600-1100 1550-2200 24 - 300-900 IV, 2 Lake Victoria/Thika(part)600-1100 1550-2200 22 - 24900-1200 V, 1-2 Taveta/Isiolo 22 - 300 - 1200450- 900 1650-2300 VI, 1-2 22 - 300 - 1200Magadi/Garba Tula 300-550 1900-2400 0-1200 VII, 1-2 150- 350 2100-2500 22 - 30Wajir Average annual rain fall, mm Note; Prec. Average annual potential evaporation, mm Evap. Mean annual temperature, (deg.C) Temp. Alt. Altitude, m Climate adaptability(D) : No data Preferable ecological zone (H) : No data Ca : No data Environmental requirements(G) d. Site requirements(I) : No data e. : This species is found in coastal forest (5) Distribution in Kenya and in very dry parts of Kenya(A). It grows in desert area and dry coastal forests. It can be found in lower Meru District(B). Soil Characteristics (6): Shade tolerance (7): Occasionally 15 m(A). Mature tree's height (8)Mature tree's diameter (9): Timber for house building, live fence, Utilization (10): It's hard, heavy, dark-brown wood is (11) Others almost termite-proof and very durable(B). 2 Seed Month of flowering (1)Month of collection (2) Method of collection (3)Method of preparation (4)Method of storage (5)Number of seeds per fruit: (6)Number of seeds per Kg. or 1.: (7)Usual germination rate (8)

121

3 Seedling

- (1) Applied seed pretreatment:
- (2) Types of seedling

a. Pot seedling : Operational
b. Stump : Not examined
c. Bare root : Not examined

- (3) Sowing month at Tiva Nursery : September to December
- (4) Growing speed in the nursery : Slow
- (5) Note for watering : Avoid too much watering.
- (6) Note for other things

4 Plantation

- (1) Site condition
- (2) Land Preparation : In 1988, strip clearing 1m width slashing and 2m remaining, but not cut down useful trees more than 5cm in D.B.H.
- (3) Number of seedlings per ha : In 1988, 1,000 seedlings/ha planted.
- (4) Size of planting hole : In 1988, 45cm x 45cm.
- (5) Weeding : Weeding is very important, at least
 - 2 times per year.
- (6) Damage :
- (7) Growing speed :
- (8) Management :(9) Some data from forestation site
 - Planted Compart. Areas Survival rate Height year Jul.89 Nov.89 Oct.90 Oct.91 Oct.90 Oct.91 % % % ha % CM 1988 0.07 I-G 42.9 6.0
- (10) Some data from extension
- (11) Others

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Species: Trichilia roka (T. emetica)
Cf. A:149, B:-, C:-, D:88, 237, E:-, F:-, G:-, H:-, I:-
      Basic data
      (1)
           Family name
                               : Meliaceae
      (2)
           Vernacular name
                               : Mururi(Kikuvu)
      (3)
           Origin
                               : Indigenous
      (4)
           Climatic condition
                Preferred climatic type(B)
                                                 : No data
                Climate adaptability(D)
                                                 : No data
                Preferable ecological zone (H) : No data
            d.
                Environmental requirements(G)
                                                 : No data
            e.
                Site requirements(I)
                                                 : No data
      (5) Distribution in Kenya
                                     : Widely distributed from coast to
                                       1,850 m(A).
      (6)
           Soil Characteristics
                                     : Preferring good soil(A).
      (7)
           Shade tolerance
           Mature tree's height
      (8)
                                     : 15 m, occasionally 30 m(A).
      (9)
           Mature tree's diameter
     (10) Utilization
                                     : Converted timber, posts, fuelwood,
                                       bee-forage, ornamental, fodder, food,
                                       medicine, wood for convertion into
                                       various products(D).
     (11) Others
2
      Seed
      (1)
           Month of flowering
           Month of collection
      (2)
           Method of collection
      (3)
           Method of preparation
      (4)
      (5)
           Method of storage
      (6)
           Number of seeds per fruit:
           Number of seeds per Kg. or 1.: 1,950 seeds/kg.(D)
      (7)
           Usual germination rate
      (8)
      (9)
           Provenance
     (10)
           Others
                                     :
      Seedling
3
           Applied seed pretreatment: None pretreatment.
      (1)
           Types of seedling
      (2)
                                     : Operational
           a. Pot seedling
                                     : Not examined
           b. Stump
                                     : Not examined
           c. Bare root
           Sowing month at Tiva Nursery : January
      (3)
           Growing speed in the nursery :
      (4)
           Note for watering : Avoid too much watering.
      (5)
```

Note for other things

(6)

4 Plantation

- (1) Site condition :
 (2) Land Preparation :
 (3) Number of seedlings per ha :
 (4) Size of planting hole :
 (5) Weeding :
 (6) Damage :
 (7) Growing speed : Fairly fast-growing in well watered sites(A).
 (8) Management :
 (9) Some data from forestation site : Not planted in the Pilot Forest.
- (10) Some data from extension
- (11) Others

