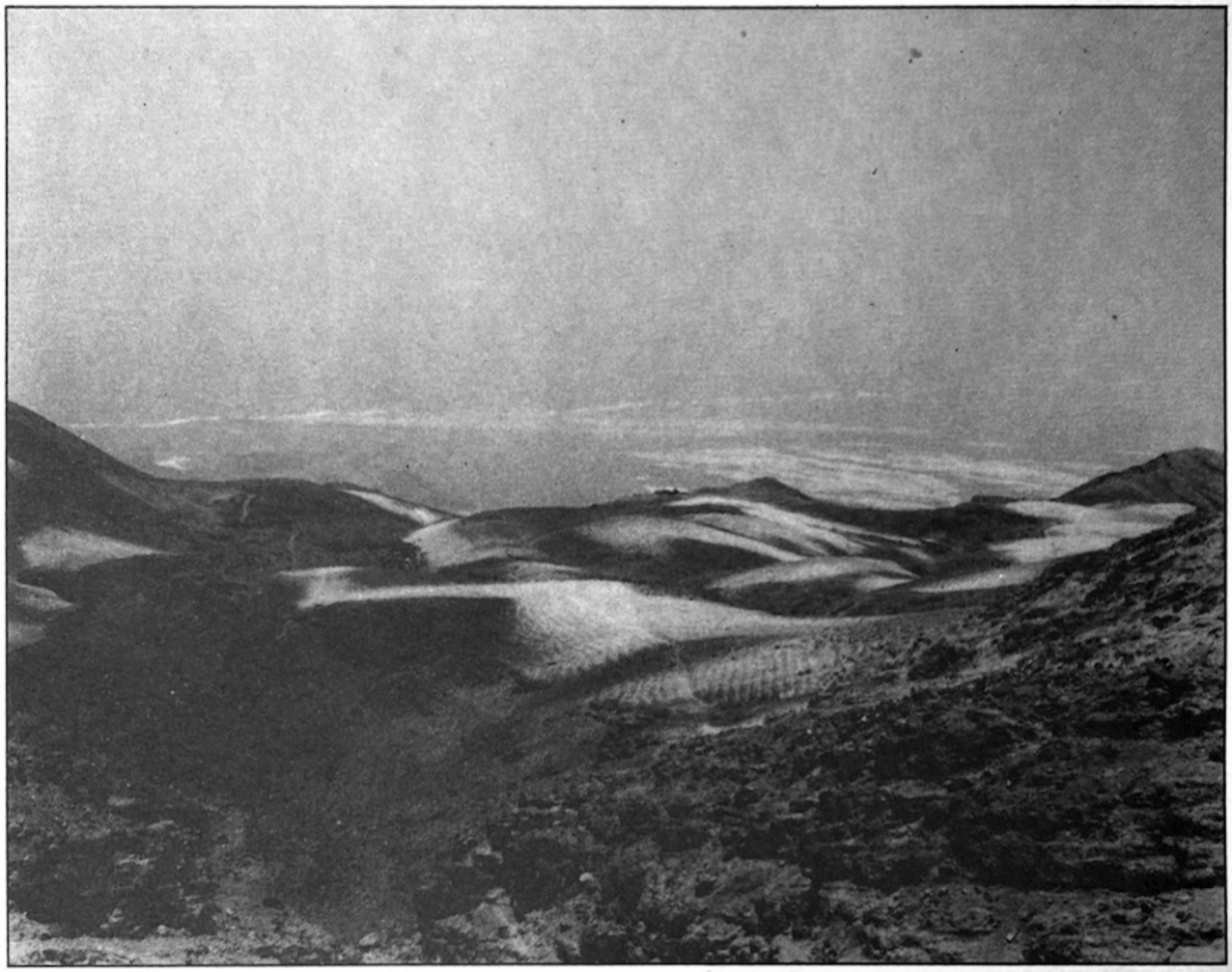
TREE SPECIES ELIMINATION TRIALS

PLANALTO LESTE — SANTO ANTÃO
REPÚBLICA DE CABO VERDE

GIDEON VAN MELLE

WORKING DOCUMENT NR: 1.
MINISTÉRIO DE DESENVOLVIMENTO RURAL
SANTO ANTÃO RURAL DEVELOPMENT PROJECT



The semi-aride zone of Planalto Leste

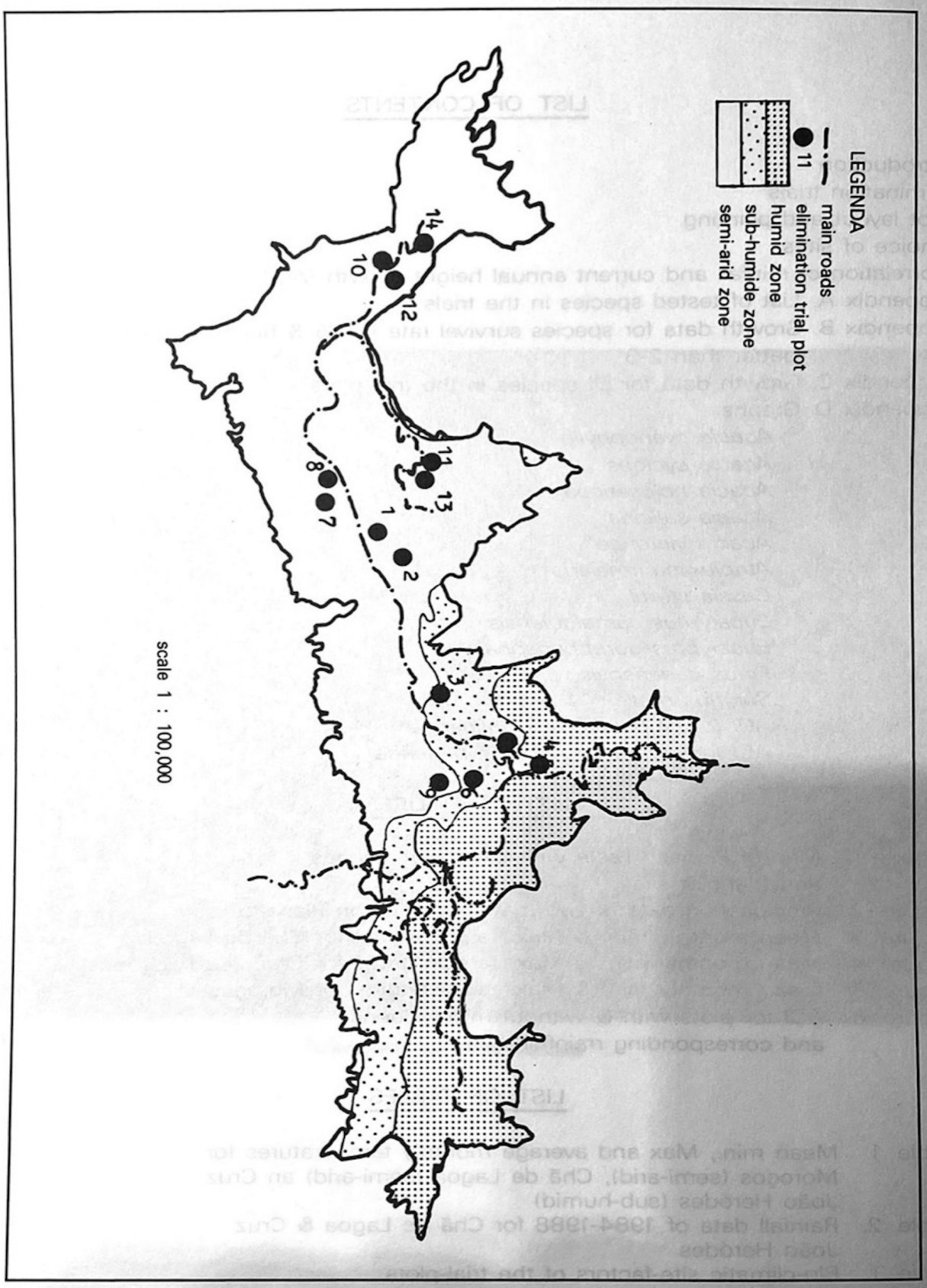


Figure 1. Map of Planalto Leste with bio-climatic zones and trial-plot sites.

ELIMINATION TRIALS OF WOODY SPECIES ON SANTO ANTÃO

Introduction.

The most western situated island of the Cape Verde Republic: Santo Antão, is one of the most rugged mountainous islands of the archipelago.

Climatic conditions are fierce, sometimes the island is under influence of the Harmattan: a dry desiccating wind coming from the Sahara, while during the best part of the year the northeastern trade-winds bring high humidity at lower altitudes, but not much relief in terms of precipitation. From august through october the inter-tropical convergence zone hovers right over the archipel and can bring rain.

Santo Antão is formed by high, since long extinct volcanoes, wich go up to an altitude of 1900 masl. The northeastern part of the island rises up to 1400 masl and is dissected by deep V-shaped valleys. The northeastern trade-wind is forced to go up by the steep cliffs and the cooling airmass forms clouds and sometimes rain in spring between 700 and 100 masl.

During winter and spring the clouds go beyond the 1000m and prolonged time of mist can be expected between 700 and 1400 masl. The Planalto Leste area has mean monthly temperatures from about 20 °C with minima of about 10 °C and maxima of about 30 °C (See Table 1 and figures 2, 3 & 4).

month	MOROÇOS			CHÃ DE LAGOA			CRUZ JOÃO HERODES		
	T_m	T_x	T_x	T_m	T_x	T_x	T_m	T_x	T_x
JAN.	12.3	20.2	28.1	10.5	19.3	28.1	12.9	15.4	17.8
FEV.	14.4	22.5	30.6	12.4	20.5	28.5	14.4	16.3	18.1
MAR	15.1	18.9	29.4	12.3	20.9	29.6	12.6	14.1	15.7
APR	14.4	22.3	30.2	11.5	19.5	27.2	13.6	16.3	19.1
MAY	14.8	21.2	27.5	13.7	19.3	24.8	14.7	19.2	23.7
JUN	12.7	23.0	33.4	19.3	23.1	26.9	16.9	20.4	23.9
JUL	15.7	23.0	30.2	20.7	24.3	28.0	18.0	21.5	25.1
AUG	18.8	21.4	23.9	18.5	23.1	27.7	18.2	20.7	23.2
SEP	?	?	?	17.3	21.3	25.2	17.0	19.4	21.7
OCT	17.7	19.9	22.1	17.9	20.9	24.0	11.7	15.1	18.5
NOV	15.4	19.5	23.7	15.4	20.7	26.0	12.0	14.9	17.7
DEC.	?	?	?	16.0	20.1	24.1	16.3	18.1	19.9
YEAR	15.2	21.2	27.2	15.5	21.1	26.7	14.9	17.6	20.4

Table 1. Mean minimum, mean maximum and mean average monthly temperatures for Moroços (semi-arid), Chã de Lagoa (semi-arid) and Cruz João Heródes (sub-humid). [1]

Rainfall pattern is very irregular and most of the yearly precipitation falls in 1 to 3 days,

1) Figures calculated from minimum-maximum daily temperatures in 1984.

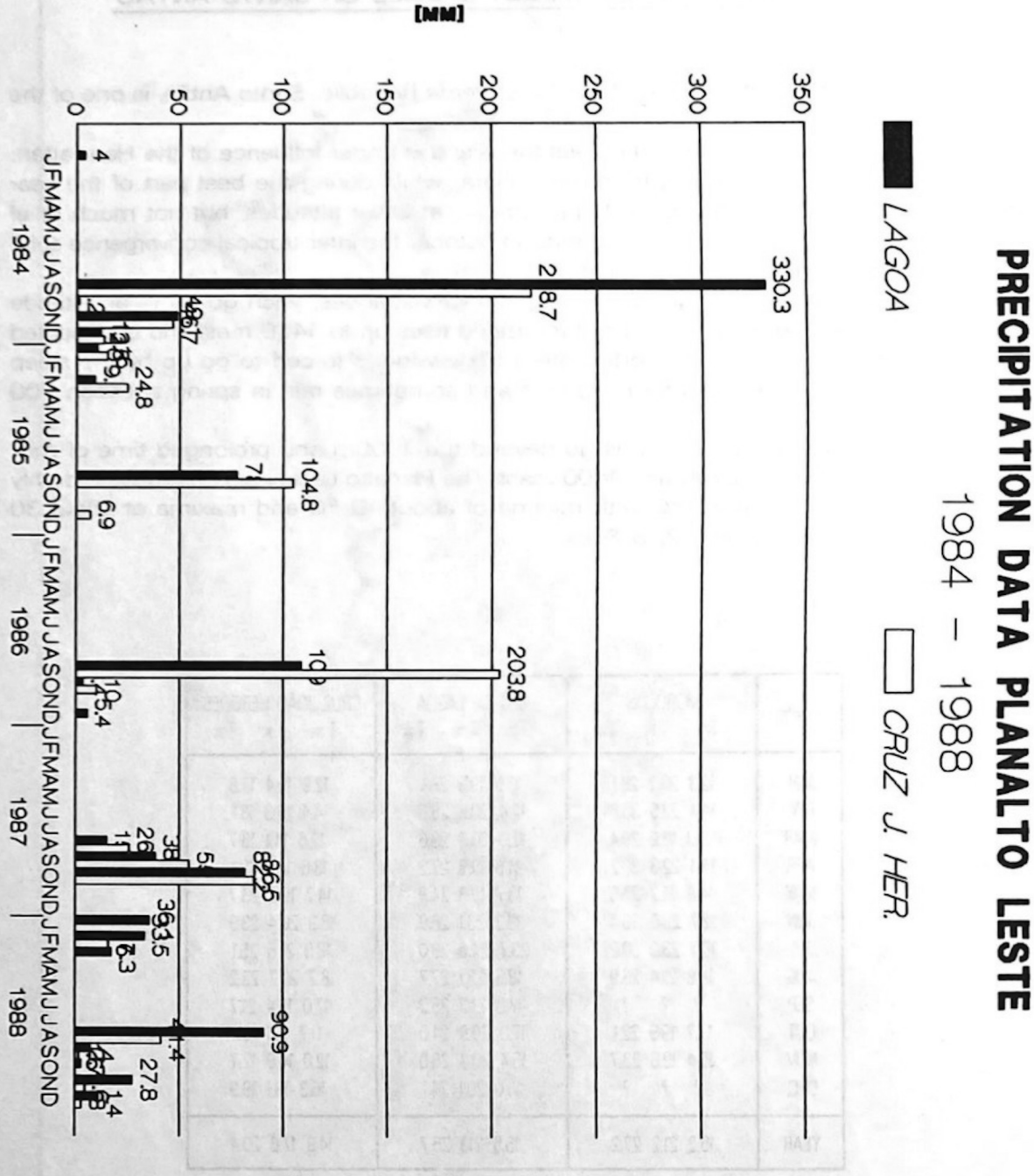


Figure 2. Precipitation data of 2 meteo-stations on Planalto Leste

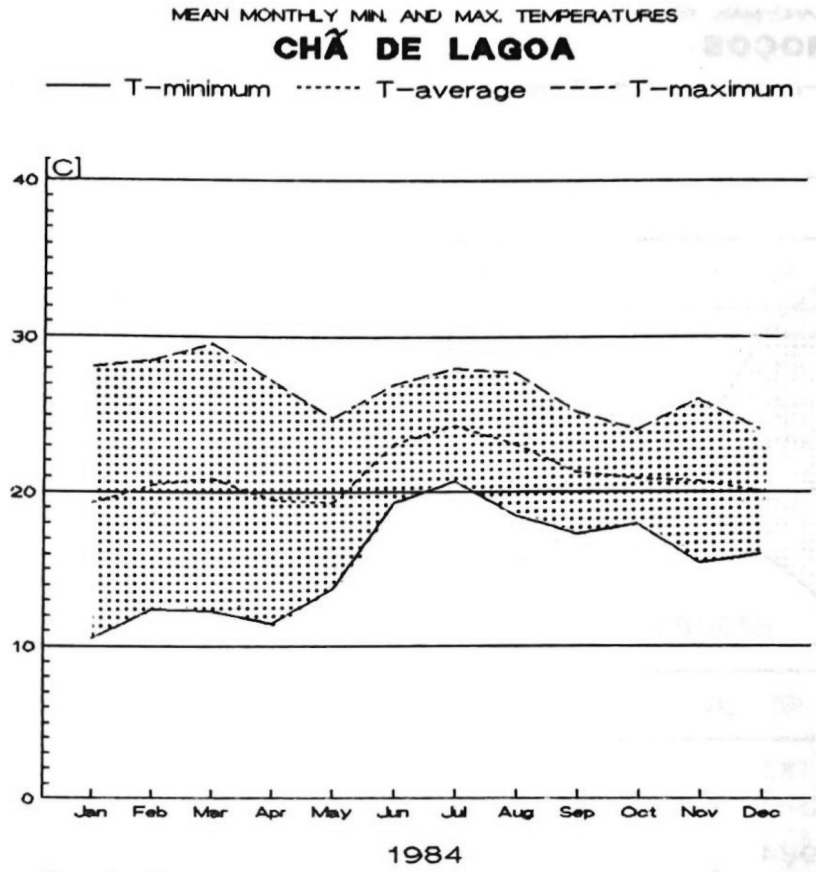


Figure 3. Mean monthly min. & Max temperatures emperatures.

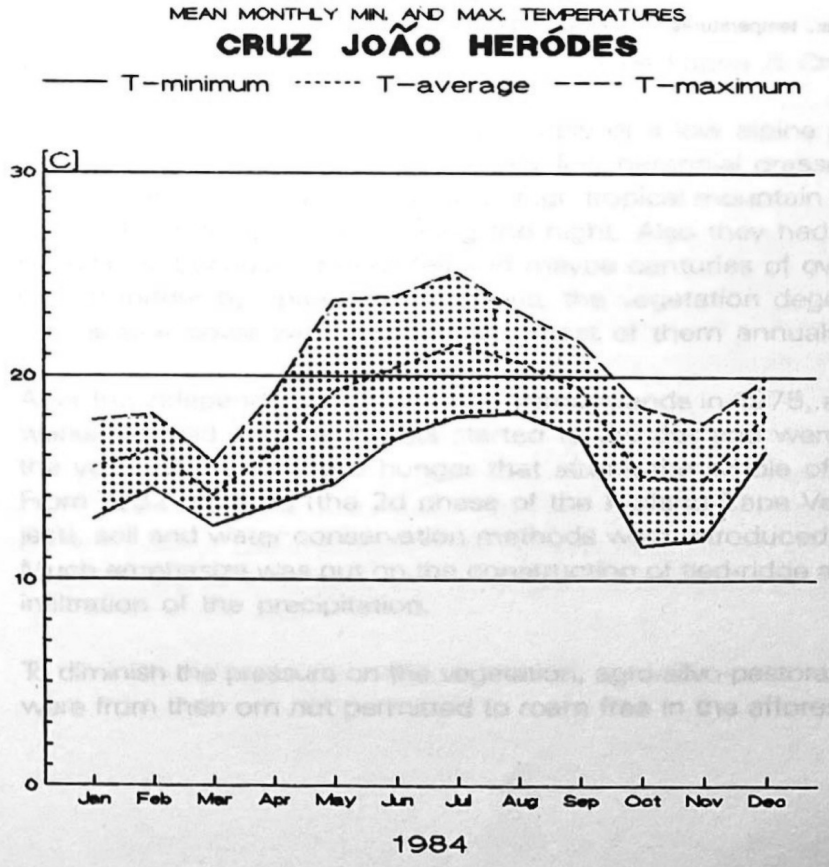


Figure 4. Mean monthly min. & Max temperatures tures.

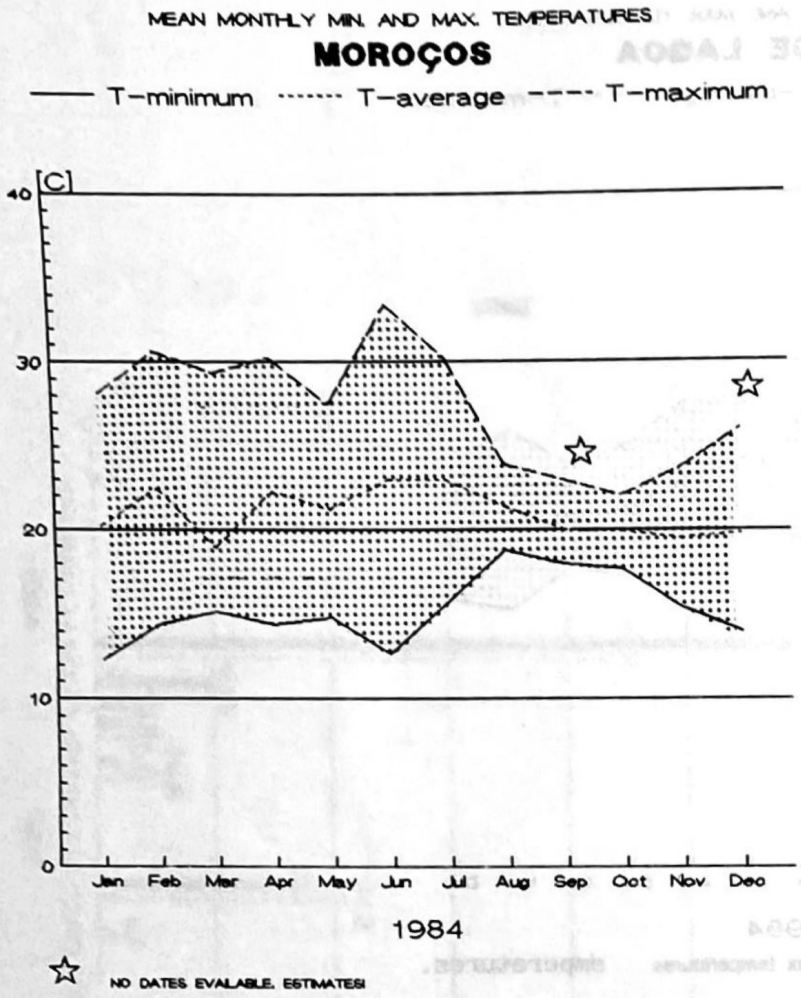


Figure 5. Mean monthly min. & Max. temperatures temperatures.

during which densities of 30mm/hr are not uncommon.
Figure 5. shows rainfall data from 1984 through 1988 for Chã de Lagoa and Cruz João Herodes: two stations in the middle of the Planalto Leste area, while table 2 gives the figures.

CHÃ DE LAGOA

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
84	4.0	–	–	–	–	–	–	–	330.3	1.2	49.1	12.0	396.6
85	10.0	–	9.2	–	–	–	–	–	78.0	–	–	–	97.2
86	–	–	–	–	–	–	–	–	109.0	3.4	–	5.4	117.8
87	–	–	–	–	–	–	–	15.0	38.8	82.2	–	–	136.0
88	36.1	33.5	17.3	–	–	–	–	90.9	7.4	2.7	27.8	11.4	227.1

CRUZ JOÃO HERÓDES

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
84	–	–	–	–	–	–	–	–	218.7	–	46.7	13.5	278.9
85	15.0	–	24.8	–	–	–	–	–	104.8	–	6.9	–	151.5
86	–	–	–	–	–	–	–	–	203.8	10.0	–	–	213.8
87	–	–	–	–	–	–	–	26.1	55.0	86.5	–	–	167.6
88	–	16.0	–	–	–	–	–	41.4	1.6	–	4.6	3.0	66.6

Table 2. Rainfall-data 1984-1988 for Chã de Lagoa & Cruz João Herodes.

The natural vegetation consisted probably of a low alpine shrubland, with small woody and sub-woody perennial shrubs, very few perennial grasses, but with a lot of annuals. Most of the species were adapted to high tropical mountain conditions with strong insolation and low temperatures during the night. Also they had to be adapted to sub-desert conditions. Because of decades and maybe centuries of overgrazing by goat and gathering of fodder by uprooting the plants, the vegetation degenerated drastically, leaving a very scarce cover with few species, most of them annuals.

After the independence of the Cape Verde Islands in 1975, all soil and water conservation works stopped and the forests started to dry out and were cut or burned down during the years of drought and hunger that struck the whole of Africa these years.
From 1982 onwards (the 2d phase of the Holland-Cape Verde bilateral cooperation project), soil and water conservation methods were introduced once more on Planalto Leste. Much emphasize was put on the construction of tied-ridge absorption terraces to facilitate infiltration of the precipitation.

To diminish the pressure on the vegetation, agro-silvo-pastoral systems were planned. Goats were from then om not permitted to roam free in the afforested areas, but had to be kept

tethered or in corrals. The local population was allowed to gather dry material for fodder and fuel, but had to cut the grasses and not pull them out as was there tradition. For this purpose reaping-hooks were distributed. On the tied-ridge terraces, locally known as «banquetas», trees were planted for fuel and fodder production. Between the banquetas the natural vegetation was allowed to grow back. On some promising areas an improved grass-seed mixture was sown.

Elimination trials.

To widen the range of suitable species for the drier zones of Planalto Leste, eleven elimination trials were estabilished after the rains of 1984 and in the following year another two. In 1984 again two were established, of which one at a lower altitude, outside the Planalto Leste area. No protocol about origin of the species and the duration of their time in the nursery was kept. All trees were nursery-raised in polyethylene bags of 1,154 ml.

Plot layout and planting method.

As a rule homogeneous slopes were chosen on which banquetas were constructed. Trees were planted after a minimum rainfall of 100mm (wet soil profile of 30cm minimum), in planting holes of 40x40x60 cm^3. Each species was represented by about 50 individuals, planted in rows of 10 with 4 repetitions. Location of the rows was at random alloted. Each year the trees were counted and for ten individuals up-slope and ten down-slope the height was measured in the month july or august, before the rainy season started. With shrubs the longest branch was measured.

As an indication of the condition of the living individuals a number from 1 to 4 was given, based on the following classification:

1 = very vigorous
2 = vigorous
3 = surviving
4 = suffering

In each bio-climatic zone: sub-humid and semi-arid, plots were planned and species selected according to knowledge available from literature and human resources. Most species are from the drier parts of Australia, the Sahelian zone of Africa, and the sub-desert zones of India and South America. All species are producing fodder or fuel-wood, are drought hardy and adapted to tropical highland conditions. Some species were already known on the island and were chosen for the sub-humid zone or for planting under more favorable circumstances such as on farmyards. A list of species is given in Appendix A. The provenance of the species has not been specified in the available information concerning the trials. One can, however, assume that they are either bought in the Netherlands (SATROPA, TIMMERS & LEYER), locally collected or from Santiago. Some seeds came directly from Australia e.g. ***Acacia calamifolia, Acacia colleteoides*** or from West-Africa.

Choice of sites.
According to the field work by **Dr. H. van Gils/ITC**[3] and the vegetation map based on the work of **IR. F. Hiemstra**[4], the Eastern Upper Catchment area of Santo Antão: Planalto Leste, can be divided in 3 main bio-climatic zones. They are named semi-arid, sub-humid and humid. According to the classification given by **Hiemstra** the semi-arid zome has <300mm precipitation, the sub-humid zone 300-600mm and the humid zone >600mm. Vegetation type 1, 2a and 2b are typical for the semi-arid zone, 2c for the sub-humid zone and 3a, 3b for the humid zone. Table 3. gives a summery of the plot-sites.

plot =	EXP	LITH	R [mm][5]	F_{pot} [mm]	Alt [masl]	Veg. type
1	S	Lapilli	350	<500	1200	2a/2b
2	ENE	Lapilli	350	<500	1260	2b
3	N	Lapilli	500	<200	1350	2c
4	SSW	Basaltic	625	<200	1400	2c/3a
5	S/SW	Lap.+Bas	630	<200	1380	2c
6	SE	Lapilli	650	<500	1355	2c
7	S	Lapilli	300	<200	1220	2a
8	N/NE	Lapilli	300	<200	1220	2a
9	SSE	Lapilli	650	<500	1375	2b
10	SE	B.+Pumice	400	<100	1625	2a
11	NNE/NW	Lapilli	350	<1000	1500	2b
12	S/SW	Lapilli	400	<100	1650	2a
13	NNE/NE	Lapilli	375	<1000	1515	2b
14	N/NW	Lap+P+B	450	<200	1600	2b

Table 3. Bio-climatic site-factors of the trial-plots.

Observations on growth and health condition.
In general one can conclude from the trials that trees growing on concave slopes or in gullies tend to be the most vigorous. This can be due to a longer availability of sub-surface water and a thicker soil profile. Survival rate is much lower on convex slopes. In general the first 3 to 4 years are the most dangerous for survival. During this period the root system is not yet sufficiently developed to reach deep enough soil strata where they can use water which is stored in fissures and faults. Rootsystems of adult trees are known to go down 25 meter to look for water. During the juvenile stage of the trees they are solely dependent on water in the topsoil and therefore on direct rainfall. The storage capacity of the

---

Gils,[3]H. van (1982)Vegetation assessment for livestock grazing and biological erosion control Eastern Upper Catchments, Santo Antão, Cabo Verde. ITC, Enschede, Netherlands.

4 Hiemstra, F. (1986) Vegetation and range-land of the Planalto Leste area (Santo Antão, Rep. de Cabo Verde). Cour. Forsch. — Inst. Senckenberg, 81: 165-177. Frankfurt a/M, BRD.

5 Data about climate from J. v/d Zee int. project information (1983).

topsoil, exposition to wind and sun are other parameters influencing the evaporation of stored water and therefore availability of water for the trees. The caracteristics of the species itself also have an influence on transpiration. A lot of tree-species with open crown and no special features to avoid excessive transpiration need to grow-up under the protection of an already existing canopy, or must be able to go through the juvenile phase without lack of water: river-beds, gullies, or by irrigation. Under the reigning climatic condition in the semi-arid and sub-humid bio-climatic zones of Planalto Leste these species had the most difficulty in surviving. Examples are: ***Zizyphus mauritiana, Tamarix gallica var. canariensis, Ceratonia siliqua, Bauhinia variegata, Bauhinia rufescens, Melia azedarach, Tipuana tipo, Peltophorum africanum, Tamarindus indica and Ailanthus altissima.***

Appendix B gives for each plot the most promising species, i.e. a survival rate higher than 70% and average health condition of at least between surviving and vigorous (2-3). If one calculates the average height growth for all species per plot, a difference can be seen in plots wich have influence of clouds — less evapotranspiration and also mist interception — and plots without.
Plot 4: Lombo das Pedras, Plot 2: Lagoinha, Plot 5: Ninho de Corvo, Plot 6: Cruzinha and Plot 11: Ribeirinha have such influence, while the rest have not. As can be seen on the graphs in Appendix D the growth curves of the above mentioned plots are higher than those of the latter. Of the trees ***Eucalyptus camaldulensis*** is the most promising species, with ***Eucalyptus gomphocephala*** as runner-up. Their growth, however, is only good in plots with a favorable exposition. As visualized in the graphs, the height-growth of ***E. Camaldulensis*** doesn't vary much in-between plots and therefore the species is more drought resistant than ***E. gomphocephala*** whose height-growth varies more.
On the drier sites higher shrubs ***Acacia victoriae, Acacia cyclops*** and to a lesser degree ***Acacia cyanophylla*** are showing high survival rates and good growth. In sub-humid zones ***Acacia salicina*** is doing well. From the lower shrubs ***Atriplex nummelaria, Acacia aneura, Cassia sturtii*** and to a lesser extend ***Acacia holoserica*** are the most drought resistant. ***Chamaecytisus proliferus*** is a shrub used as undergrowth in old forests of the humid zones. although they seem to survive, in general they are more adapted to sub--humid and humid climatic conditions.
In plot 11: Ribeirinha, two new Australian Wattles are tried out. ***Acacia calamifolia*** SWEET ex. LINDL. is a large shrub like ***Acacia cyclops.*** It has a 100% survival rate and a current annual height increment of 42cm in 4 years. The second species; ***Acacia colleteoides*** BENTH. is a small shrub like ***Acacia aneura*** and has the same behaviour in growth and survival. ***Acacia victoriae*** and ***Acacia cyanophylla*** show a wide variety in growth between plots. The current mean increment of the first seems to augment after 3 years of going down, maybe because of the priority of the root-system development over the rest of the plant during this time. ***Acacia cyanophylla,*** a fast grower shows, however, a steep decline in current mean annual increment, not yet stabilizing after 4 years. ***Parkinsonia aculeata,*** clearly is not adapted to the high zones of Planalto Leste where temperatures are too low during parts of the year. Only in plot 7 which has an average exposition towards the South and is extremely hot and dry, this species shows a promising survival

average current annual increment	YR 1	YR 2	YR 3	YR 4	BCZONE
plot 4. LOMBO DAS PEDRAS	100.0	79.9	66.1	54.8	S-H
plot 6. CRUZINHA	46.8	40.3	50.5	46.5	S-H
plot 5. NINHO DE CORVO	59.8	44.2	40.6	35.0	S-H
plot 11. RIBEIRINHA	58.7	41.9	35.3	32.0	S-A
plot 2. LAGOINHA	63.9	44.9	38.4	31.2	S-A
plot 1. LAGOA	55.0	37.3	34.1	31.0	S-A
plot 10. MOROÇOS	51.6	35.8	26.9	26.7	S-A
plot 9. MORRO DE VENTO	42.7	32.7	30.6	25.2	S-A
plot 3. CRUZ JOÃO HERÓDES	39.6	31.0	26.9	22.9	S-H
plot 7. LAGOA	44.8	30.2	22.9	20.0	S-A
plot 8. LAGOA	36.5	21.3	21.4	19.1	S-A
plot 12. MOROÇOS	30.9	21.5	19.0		S-A
plot 13. RIBEIRINHA	46.0	29.4	26.1		S-A
ALLOVER AVERAGE	52.0	37.7	33.8	31.3	

Table 4. ACI per plot, sorted on best ACI in 4th year.

average current annual increment	YR 1	YR 2	YR 3	YR 4	BCZONE
plot 4 LOMBO DAS PEDRAS	100.0	79.9	66.1	54.8	S-H
plot 6. CRUZINHA	46.9	40.3	50.5	46.5	S-H
plot 5. NINHO DE CORVO	59.8	44.2	40.6	35.0	S-H
plot 11. RIBEIRINHA	58.7	41.9	35.3	32.0	S-A
plot 2. LAGOINHA	63.9	44.9	38.4	31.2	S-A
ALLOVER AVERAGE	65.8	50.2	46.2	39.9	

Table 5. ACI for plots with mist influence, sorted on best ACI in 4th year.

average current annual increment	YR 1	YR 2	YR 3	YR 4	BCZONE
plot 1. LAGOA	55.0	37.3	34.1	31.0	S-A
plot 9. MORRO DE VENTO	42.7	32.7	30.6	25.2	S-A
plot 3. CRUZ JOÃO HERÓDES	39.6	31.0	26.9	22.9	S-H
plot 10. MOROÇOS	51.6	35.8	26.9	26.7	S-A
plot 13. RIBEIRINHA	46.0	29.4	26.1		S-A
plot 7. LAGOA	44.8	30.2	22.9	20.0	S-A
plot 8. LAGOA	36.5	21.3	21.4	19.1	S-A
plot 12. MOROÇOS	30.9	21.5	19.0		S-A
ALLOVER AVERAGE	43.4	29.9	26.9	24.2	

iable 6. ACI for plots without mist influence, sorted on best ACI in 3d year.

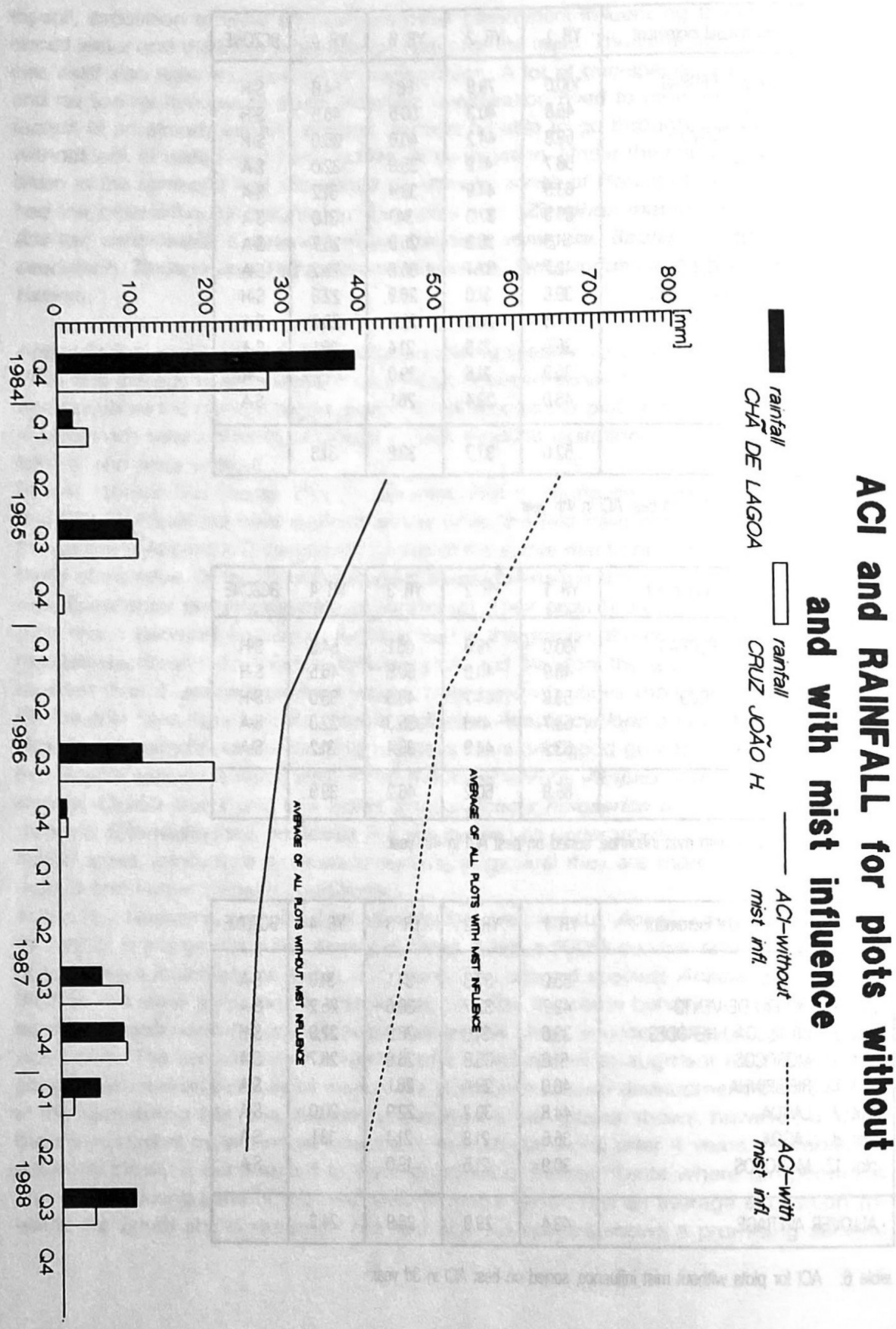


Figure 6. ACI for plots with & without mist influence and corresponding rainfall data

rate and health condition. ***Pinus spp.*** were tried in plot 6, 8, 11, and 12. Only plot 6: Cruzinha shows a high survival rate and vigorous health condition for both ***Pinus halepensis*** and ***Pinus canariensis.***

Correlation of rainfall and current annual height growth (CAI).
For each plot the weighed average current annual increment in heigth was calculated. By sorting the plots on the last year of measurements, a correlation was established with the presence of mist during at least 3 months a year. Three plots with the highest CAI for 1988 are situated in the sub-humid zone, while the two situated in the semi-arid zone have an exceptional exposition in connection with passing clouds. (see **tables 4, 5 & 6** and **figure 6).** From the plots without cloud or mist influence the average CAI is significantly lower. One plot, although situated in the sub-humid zone, has a very bad exposition and is situated on a slope with shallow soil profile. From the graph can be deduced that during the season after the rains of september 1984, when most of the trial-plots were established, CAI was the highest. Growing seasons of 1986 and 1987 weren't that good and the CAI for both types of sites decreased. Plots with mist influence have an average CAI which is overall 20 cm higher than in plots without mist influence.
The total rainfall for Chã de Lagoa was 746.6mm, while for Cruz João Heródes 818.8mm from 1/1984 through 9/1988 or almost 5 years. this is an average of 149mm for Lagoa and 164mm for Cruz: both desert climates!

Conclusions and recommendations for future experiments.
After 6 years of afforestation on the Planalto Leste, terrain suitable for tree planting is getting harder and harder to find. In the semi-arid zones were nature isn't able to grow trees . . . : the project is trying to. Especially the sites with exposure towards the South aren't worth the effort to continue with expensive afforestation methods but call for a somewhat less capital intensive way of soil conservation. As the main cause for degradation of the natural vegetation is (beside changes in species composition and density by prolonged drought) the overstepping of the carrying capacity by livestock (mainly goats) and human beings (the gathering of fuel and fodder), it seems only logical to assume that simple protection against these activities will restore the vegetation cover to a, by the reigning meteorological conditions, fixed level of climax. Some technical intervention might be needed to check rill and gully erosion and certainly a forest guard must be present to prevent grazing and gathering of live vegetational matter.
For the better sites with ocurrence of mist (horizontal precipitation) more emphasise must be given to palatable forage species as a protein reserve to overcome the dry months. Also here more attention has to be given to other ways of planting: direct sowing of treated seed.
The growing of firewood should be more concentrated around settlements. Long trips on foot to gather fuelwood can thus be avoided and if multiple use trees or shrubs are planted i.e. ornamental or fruit producing species, more care can be expected from the population. Homestead planting especially can profit during the juvenile period of the tree from irrigation with waste water.
As no further changes will be expected in selection of suitable species by continuing the elimination trials, some plots will be abandoned and other changed in growth trials for the most promising species.

Appendices

The document carries 4 appendices. Appendix A gives a list of tree-species with their scientific, English and local names, as far as known. Appendix B gives an overview of the mean annual growth of the surviving trees with the best condition. Appendix C is an overview of all species in all plots and Appendix D contains some graphs concerning the most promising species giving the annual length-growth and the current mean increment.

Appendix A.

SPECIES TESTED IN ELIMINATION TRIALS

	Scientific name	english name	local name
01	*Acacia albida* DELILE	Winterthorn, ana tree	Espinho branco
02	*Acacia aneura* F. MUELL. ex BENTH.	Mulga	----------
03	*Acacia calamifolia* SWEET ex LINDL.	----------	----------
04	*Acacia colletioides* BENTH	----------	----------
05	*Acacia cyanophylla* LINDL. 1)	orange wattle, blue leaf wattle	----------
06	*Acacia cyclops* A. CUNN ex G. DON	Western Australia coastal wattle	----------
07	*Acacia farnesiana* (L.) WILLD.	Cassie flower	Acácia esponja, Espongeiro
08	*Acacia holosericea* A. CUNN. ex G. DON	----------	----------
09	*Acacia nilotica* (L.) WILLD ex DELILE	Egyptian-thorn	Espinheiro preto
10	*Acacia salicina* LINDL.	willow wattle	----------
11	*Acacia senegal* (L.) WILLD.	gum-arabic-tree	----------
12	*Acacia seyal* DELILE	Tahl, Thirsty thorn	----------
13	*Acacia tortilis* (FORSK.) HAYNE	umbrella-thorn	----------
14	*Acacia victoriae* BENTH	Gundabluey, Prickly wattle	----------
15	*Ailanthus altissima* (MILL.) SWINGLE	tree-of-heaven	----------
16	*Atriplex halimus* L.	----------	----------
17	Atriplex nummelaria LINDL.	Old-man Saltbush	----------
18	*Atriplex semibaccata* R.BR.	----------	----------
19	Atriplex sp. «#2»	----------	----------
20	Atriplex sp. «erecta»	----------	----------
21	*Atriplex* sp. «vermelho»	----------	----------
22	*Balanites aegyptiaca* (L.) DEL.	camel-thorn	----------
23	*Bauhinia rufescens* LAN	----------	----------
24	*Bauhinia variegata* L.	Orchid tree	----------
25	*Caesalpinia spinosa* (MOL.) O. KUNTZE	----------	----------
26	*Cassia sturtii* R.BR.	----------	----------
27	*Casuarina stricta* ATT.	Drooping She-oak, coast she-oak	Casuarina
28	*Ceratonia siliqua* L.	Carob, Locust bean	Alfarrobeira
29	*Chamaecytisus proliferus* (L. fil) LINK	Broom	Chatiço
30	*Cupressus arizonica* GREENE	Arizona cypress	Cupressus
31	*Eucalyptus camaldulensis* DEHNH.	river redgum	Eucalipto
32	*Eucalyptus gomphocephala* A.DC.	tuart	Eucalipto
33	*Gleditsia triacanthos* L.	honeylocust	----------
34	*Leucaena leucocephala* (LAM.) DE WIT 2)	leuceana, ipil-ipil	Pela-rabo, Linhaço
35	*Melia azedarach* L.	Chinaberry, Persian lilac	Tendente
36	*Parkinsonia aculeata* L.	jerusalem-thorn, Horsebean	Acácia martins
37	*Peltophorum africanum* SOND.	African Wattle	----------
38	*Pinus canariensis* CHR. SM ex DC.	Canary Island Pine	Pinheiro
39	*Pinus halepensis* MILL.	Aleppo pine	Pinheiro
40	*Prosopis spicigera* L. 3)	Jand, Khejri	----------
41	*Prosopis tamarugo* F. PHILIPPI	Tamaruga	----------
42	*Schinus molle* L.	Pepper Tree, Terebinto	Pimenteira
43	*Tamarindus indica* L.	tamarind	Tamarindo, Tambarinha
44	*Tamarix gallica canariensis* (WILLD) PIT.	Tamarisk, Salt cedar	Tarafe
45	*Tipuana tipo* (BENTH) O. KUNTZE	Tipuana, Tipa, Tipu	----------
46	*Zizyphus mauritiana* LAM. 4)	Indian jujube	Zimbrão

1) =SYN: *Acacia saligna* (LABIL.) H. WENDL
2) =SYN: *Leucaena glauca* BENTH.
3) =SYN: *Prosopis cineraria* L.) DRU
4) =SYN: *Zizyphus jujuba* (L.) LAM., non MILL

appendix B.

PLOT N.º: 01

SPECIES	84	85		86		87		88		
	Nº	%	H[cm]	%	H[cm]	%	H[cm]	%	H[cm]	Con
Eucalyptus camaldulensis	15	100	84.0	100	130.0	100	164.0	100	231.0	1
Schinus molle	49	100	100.0	100	129.0	100	133.0	100	153.0	1-2
Eucalyptus gomphocephala	27	96	82.0	96	124.0	96	148.0	96	160.0	1-2
Acacia victoriae	49	100	51.0	100	88.0	94	188.0	94	206.0	1-2
Cassia sturtii	50	98	56.0	98	64.0	80	89.0	80	99.0	1-2
Acacia cyclops	49	98	75.0	98	98.0	98	153.0	98	186.0	2
Acacia farnesiana	49	94	46.0	92	81.0	92	99.0	92	102.0	2
Acacia seyal	48	100	53.0	100	65.0	79	110.0	79	133.0	2

plot N.º: 02

SPECIES	84	85		86		87		88		
	N.º	%	H[cm]	%	H[cm]	%	H[cm]	%	H[cm]	Con
Acacia cyclops	45	96	71.9	96	102.2	96	125.5	96	149.0	1
Acacia victoriae	41	98	32.6	98	45.5	98	78.7	98	122.5	1-2
Acacia cyanophylla	48	96	109.0	96	153.0	96	172.0	96	183.0	1-2
Eucalyptus camaldulensis	42	81	72.8	81	114.5	79	160.0	79	198.5	1-2
Atriplex nummelaria	38	100	115.0	100	141.0	100	144.0	100	171.0	2
Atriplex halimus	49	96	59.0	96	86.0	96	100.0	96	117.0	2

PLOT N.º: 03

SPECIES	84	85		86		87		88		
	N.º	%	H[cm]	%	H[cm]	%	H[cm]	%	H[cm]	Con
Cassia sturtii	50	100	40.0	100	51.0	100	66.0	100	76.1	2-3

PLOT N.º: 04

SPECIES	84	85		86		87		88		
	N.º	%	H[cm]	%	H[cm]	%	H[cm]	%	H[cm]	Con
Acacia cyanophylla	72	100	136.6	100	235.3	100	273.0	90	286.4	1-2
Eucalyptus gomphocephala	47	100	111.5	96	201.0	89	255.0	87	286.5	2

PLOT N.º: 05

SPECIES	84	85		86		87		88		
	N.º	%	H[cm]	%	H[cm]	%	H[cm]	%	H[cm]	Con
Acacia cyanophylla	47	98	128.0	92	189.0	77	257.0	72	291.0	1-2

PLOT N.º: 06

SPECIES	84 N.º	85 %	85 H[cm]	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	Con
Acacia salicina	45	84	57.5	78	118.6	78	196.7	76	254.5	1
Pinus canariensis	48	88	41.4	88	54.5	76	92.2	74	131.0	2
Pinus halepensis	46	96	35.9	85	64.1	76	196.7	74	254.5	2

PLOT N.º: 07

SPECIES	84 N.º	85 %	85 H[cm]	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	Con
Parkinsonia aculeata	29	100	42.5	100	63.5	69	87.0	69	98.0	2-3

PLOT N.º: 08

SPECIES	84 N.º	85 %	85 H[cm]	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	Con
Atriplex nummelaria	10	100	—	100	—	100	—	100	—	2

PLOT N.º: 09

SPECIES	84 N.º	85 %	85 H[cm]	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	Con
Acacia cyanophylla	49	98	81.0	98	117.0	94	140.0	90	94.0	1-2
Acacia salicina	49	88	40.0	88	90.0	88	140.0	86	164.0	1-2
Chamaecytisus proliferus	47	81	62.0	81	97.0	75	89.0	75	131.0	2

PLOT N.º: 10

SPECIES	84 N.º	85 %	85 H[cm]	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	Con
Atriplex nummelaria	20	100	86.0	100	113.0	100	120.0	100	124.0	1-2
Cassia sturtii	29	100	39.0	100	47.0	100	59.0	100	71.0	1-2
Eucalyptus camaldulensis	38	100	97.0	100	114.6	95	137.1	87	178.0	1-2

PLOT N.º: 11

SPECIES	84 N.º	85 %	85 H[cm]	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	Con
Eucalyptus gomphocephala	46	98	92.5	95	145.1	93	179.3	89	218.8	1
Acacia calamifolia	14	100	65.6	100	118.5	100	153.2	100	167.8	1-2
Acacia victoriae	48	100	49.0	100	65.0	100	85.5	98	82.2	1-2
Cassia sturtii	49	100	43.5	100	54.5	98	74.2	98	88.7	1-2
Acacia cyanophylla	50	100	82.5	100	117.7	100	147.5	92	176.7	2
Cupressus arizonica	48	94	66.9	94	81.3	92	108.0	90	137.0	2
Acacia collecteoides	10	100	52.1	80	63.4	80	51.4	80	50.0	2

PLOT N.° 12

SPECIES	85 N.°	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	Con
Acacia victoriae	38	84	20.6	89	49.4	92	74.8	2

PLOT N.° 13

SPECIES	85 N.°	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	Con
Atriplex halimus	28	93	85.5	93	103.9	86	151.0	2

PLOT. N.° 14

SPECIES	87 N.°	88 %	88 H[cm]	Con
Acacia cyclops	30	93	84.0	1
Cassia Sturtii	50	100	44.0	1-2
Acacia victoriae	40	90	32.0	2

Appendix C.

PLOT N.º 01
SITE: LAGOA
Planted: 11/12/84 R:375 mm
Exp.: S F:<500 mm
lith: Lapilli Alt: 1200 M

bio-climatic zone: semi-arid
species : 26
total n.º 1036

SPECIES	84 N.º	85 %	85 H[cm]	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	88 Con
Acacia albida	49	73	20.0	61	22.3	26	—	16	40.0	4
Acacia aneura	43	100	49.1	100	56.9	100	69.4	100	66.0	2-3
Acacia cyanophylla	49	100	100.0	100	130.0	78	164.0	65	231.0	2
Acacia cyclops	49	98	75.0	98	98.0	98	153.0	98	186.0	2
Acacia farnesiana	49	94	46.0	92	81.0	92	99.0	92	102.0	2
Acacia holoserica	50	84	26.7	82	47.7	82	67.2	80	81.1	3
Acacia seyal	48	100	53.0	100	65.0	79	110.0	79	133.0	2
Acacia tortilis	45	78	25.7	78	31.9	73	64.7	51	73.3	3
Acacia victoriae	49	100	51.0	100	88.0	94	188.0	94	206.0	1-2
Atriplex nummelaria	12	100	101.0	92	96.0	83	99.0	83	—	3
Atriplex semibaccata	15	87	—	87	61.0	67	47.0	67	—	2
Atriplex sp. «erecta»	11	100	—	100	159	100	163.0	100	—	2-3
Atriplex sp. «vermelho»	12	92	60.0	92	127.0	92	85.0	92	—	3
Bauhinia rufescens	47	75	17.6	66	21.0	21	35.0	19	—	4
Cassia sturtii	50	98	56.0	98	64.0	80	89.0	80	99.0	1-2
Casuarina stricta	41	93	68.1	93	78.8	61	100.4	44	—	4
Ceratonia siliqua	48	83	28.6	77	34.0	71	42.0	58	61.0	3
Eucalyptus camaldulensis	15	100	84.0	100	130.0	100	164.0	100	231.0	1
Eucalyptus gomphocephala	27	96	82.0	96	125.0	96	148.0	96	160.0	1-2
Melia azedarach	50	100	74.7	96	82.7	90	73.5	40	79.7	4
Parkinsonia aculeata	50	98	49.0	94	84.0	92	130.0	90	174.0	2-3
Schinus molle	49	100	100.0	100	129.0	100	133.0	100	153.0	1-2
Tamarindus indica	38	66	25.0	47	30.0	21	47.0	5	—	3-4
Tamarix gallica var. canariensis	47	98	64.8	98	66.9	94	71.3	87	80.3	3-4
Tipuana tipo	49	92	57.5	82	77.8	69	75.1	51	64.7	4
Zizyphus mauritiana	44	91	21.0	87	20.6	80	37.0	73	40.4	4

PLOT. N.° 02
SITE: LAGOINHA
Planted: 21/12/84 R:350 mm
Exp. ENE F:<500 mm
Lith: Pyroclastic Alt: 1260 M

bio-climatic zone: semi-arid
species: 18
total n.° 766

SPECIES	84	85		86		87		88		
	N.°	%	H[cm]	%	H[cm]	%	H[cm]	%	H[cm]	Con
Acacia cyanophylla	48	96	109.0	96	153.0	96	172.0	96	183.0	1-2
Acacia cyclops	45	96	71.9	96	102.2	96	125.5	96	149.0	1
Acacia farnesiana	54	87	35.6	87	77.3	87	101.0	87	99.0	3
Acacia holoserica	48	88	22.7	85	25.0	81	70.6	81	88.0	2-3
Acacia senegal	34	29	—	18	19.2	12	20.0	12	10.0	3
Acacia tortilis	38	13	10.0	13	15.0	11	80.0	11	76.0	3
Acacia victoriae	41	98	32.6	98	45.5	98	78.7	98	122.5	1-2
Atriplex halimus	49	96	59.0	96	86.0	96	100.0	96	117.0	2
Atriplex nummelaria	38	100	115.0	100	141.0	100	144.0	100	171.0	2
Casuarina stricta	42	71	71.3	67	91.4	57	134.0	55	138.3	3-4
Ceratonia siliqua	50	88	—	86	—	80	—	70	30.0	3
Cupressus arizonica	47	98	65.9	98	77.1	91	97.9	87	109.2	2-3
Chamaecytisus proliferus	46	100	94.0	98	139.0	93	145.0	91	145.0	3
Eucalyptus camaldulensis	42	81	72.8	81	114.5	79	160.0	79	198.5	1-2
Gleditsia triacanthos	17	88	27.0	71	22.7	41	23.0	35	31.3	3-4
Parkinsonia aculeata	49	61	31.3	61	53.3	61	85.7	61	102.3	2
Prosopis spicigera	43	0	—	0	—	0	—	0	—	—
Prosopis tamarugo	35	3	—	3	—	3	—	3	25.0	4

PLOT N.° 03
SITE: CRUZ JOÃO HERÓDES
Planted: 28/11/84 R: 500 mm
Exp: N F: < 200 mm
Lith: Lapilli Alt: 1350 M

bio-climatic zone: semi-arid
species: 13
total n.° 623

SPECIES	84	85		86		87		88		
	N.°	%	H[cm]	%	H[cm]	%	H[cm]	%	H[cm]	Con
Acacia cyanophylla	49	94	76.0	92	115.3	80	140.8	67	170.6	2-3
Acacia cyclops	49	100	67.8	92	81.0	84	97.6	63	102.8	3
Acacia holosericea	49	86	30.7	86	50.0	78	62.5	76	76.6	4
Acacia tortilis	45	29	18.5	22	21.2	13	45.0	11	45.0	3
Acacia victoriae	46	93	24.8	93	36.0	91	51.0	89	54.0	2-3
Balanites aegyptiaca	47	17	9.4	11	12.0	6	10.0	4	11.0	4
Cassia sturtii	50	100	40.0	100	51.0	100	66.0	100	76.1	2-3
Casuarina stricta	47	66	56.0	62	83.0	23	140.0	19	175.0	3-4
Chamaecytisus proliferus	46	93	38.4	89	101.4	74	131.0	50	119.5	3-4
Leuceana leucocephala	47	100	41.5	100	58.0	96	75.9	77	102.7	3-4
Parkinsonia aculeata	50	92	28.8	90	48.3	76	59.9	72	63.2	4
Peltophorum africanum	48	94	11.6	90	25.0	79	47.5	65	79.9	3-4
Tamarindus indica	50	32	18.4	12	16.0	2	—	2	14.0	4

PLOT N.º: 04
SITE: LOMBO DAS PEDRAS
Planted: 27/11/84 R : 625 mm
Exp.: SSW F:<200 mm
Lith: Basaltic Alt: 1400 M

bio-climatic zone: sub-humid
species: 8
total n.º 340

SPECIES	84 N.º	85 %	85 H[cm]	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	88 Con
Acacia cyanophylla	72	100	136.6	100	235.3	100	273.0	90	286.4	1-2
Chamaecytisus proliferus	46	98	155.6	89	218.0	87	229.2	78	236.7	3
Eucalyptus gomphocephala	47	100	111.5	96	201.0	89	255.0	87	286.5	2
Gleditsia triacanthos	33	97	36.5	70	41.3	36	43.4	21	28.3	3-4
Melia azedarach	48	85	66.4	60	56.3	48	47.0	27	50.0	4
Parkinsonia aculeata	42	26	45.7	19	76.5	17	120.0	17	147.0	3
Prosopis spicigera	12	58	11.9	33	16.3	17	—	17	12.0	4
Tamarix gallica var. canariensis	40	95	71.6	88	82.0	60	69.0	50	56.7	3-4

PLOT N.º: 05
SITE: NINHO DE CORVO
Planted: 22/11/84 R : 630 mm
Exp.: S/SW F:<200 mm
Lith: Pyroclastic + Basaltic Alt: 1380 M

bio-climatic zone: sub-humid
species: 11
total n.º 516

SPECIES	84 N.º	85 %	85 H[cm]	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	88 Con
Acacia aneura	43	93	44.0	88	59.0	88	81.0	88	90.0	3
Acacia cyanophylla	47	98	128.0	92	189.0	77	257.0	72	291.0	1-2
Acacia nilotica	49	61	32.9	35	35.2	29	45.0	20	47.0	3-4
Acacia tortilis	47	70	11.0	32	27.0	32	49.5	30	56.3	3-4
Bauhinia variegata	45	56	30.2	49	41.0	49	70.0	49	79.0	3-4
Chamaecytisus proliferus	44	91	107.0	86	140.2	77	171.0	75	202.9	3
Eucalyptus camaldulensis	47	98	80.0	94	102.0	84	133.0	84	160.0	2-3
Parkinsonia aculeata	35	80	28.6	63	38.8	51	47.1	43	43.6	3-4
Prosopis spicigera	65	25	10.0	3	—	0	—	0	—	—
Schinus molle	49	88	54.1	84	68.0	84	104.0	82	110.6	3
Tamarix gallica var. canariensis	45	47	47.8	42	36.4	2	50.0	0	—	—

PLOT N.°: 06
SITE: CRUZINHA
Planted: 19/12/84 R : 650 mm
Exp.: SE F:<200 mm
Lith: Lapilli Alt: 1355 M

bio-climatic zone: semi-arid
species: 12
total n.° 508

SPECIES	84 N.°	85 %	85 H[cm]	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	Con
Acacia cyanophylla	49	88	68.6	59	113.9	20*	259.0	20*	159.4	2
Acacia farnesiana	45	62	46.0	22	51.3	22	106.0	22	116.7	3
Acacia nilotica	56	21	21.0	11	55.0	9	87.6	7	90.0	3
Acacia salicina	45	84	57.5	78	118.6	78	196.7	76	254.5	1
Acacia senegal	27	44	21.0	15	39.0	15	56.0	15	60.8	3
Atriplex nummelaria	40	70	60.4	58	78.3	43	99.0	38	111.6	3
Casuarina stricta	31	55	59.5	23	96.9	13	151.9	13	157.9	4
Chamaecytisus proliferus	47	62	28.0	45	—	30	—	30	—	3
Gleditsia triacanthos	24	13	31.8	0	—	0	—	0	—	—
Parkinsonia aculeata	50	36	—	12	—	6	—	2	—	4
Pinus canariensis	48	88	41.4	88	54.5	76	92.2	74	131.0	2
Pinus halepensis	46	96	35.9	85	64.1	76	196.7	74	254.5	2

* = replanted

PLOT N.°: 07
SITE: LAGOA
Planted: 26/11/84 R : 300 mm
Exp.: S F:<200 mm
Lith: Lapilli Alt: 1220 M

bio-climatic zone: semi-arid
species: 8
total n.° 351

SPECIES	84 N.°	85 %	85 H[cm]	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	Con
Acacia cyanophylla	49	98	58.5	94	70.2	27	81.0	20	124.0	3-4
Acacia nilotica	50	96	33.6	94	40.0	86	44.2	82	52.8	3-4
Atriplex nummelaria	49	98	55.0	98	82.1	69	79.4	53	101.2	3
Bauhinia rufescens	50	64	16.1	44	19.0	4	—	4	30.0	4
Chamaecytisus proliferus	47	81	59.0	55	72.0	36	79.0	32	72.8	3
Gleditsia triacanthos	32	28	25.6	0	—	0	—	0	—	—
Parkinsonia aculeata	29	100	42.5	100	63.5	69	87.0	69	98.0	2-3
Zizyphus mauritiana	45	51	—	31	—	2	—	2	—	3-4

PLOT N.°: 08
SITE: LAGOA
Planted: 11/12/84 R : 300 mm
Exp.: N/NE F:<200 mm
Lith: Lapilli Alt: 1220 M

bio-climatic zone: semi-arid
species: 11
total n.° 326

SPECIES	84 N.°	85 %	85 H[cm]	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	88 Con
Acacia cyanophylla	40	88	28.8	85	49.0	75	76.0	58	111.8	3
Atriplex nummelaria	10	100	—	100	—	100	—	100	—	2
Atriplex semibaccata	10	0	—	0	—	0	—	0	—	—
Atriplex sp. «erecto»	10	?	—	?	—	?	—	20	—	3
Atriplex sp. «vermelho»	9	0	—	0	—	0	—	0	—	—
Cupressus arizonica	50	80	44.9	72	41.3	50	59.0	42	66.0	3-4
Chamaecytisus proliferus	35	69	58.8	51	75.8	40	83.8	29	91.5	4
Parkinsonia aculeata	30	63	15.6	40	29.2	7	45.0	7	—	3-4
Pinus canariensis	31	81	47.8	68	50.6	52	62.0	48	56.1	3-4
Pinus halepensis	40	98	25.0	90	33.3	58	46.2	55	56.2	3
Prosopis spicigera	61	2	5.0	0	—	0	—	0	—	—

PLOT N.°: 09
SITE: MORRO DE VENTO
Planted: 27/12/84 R : 650 mm
Exp.: SSE F:<200 mm
Lith: Lapilli Alt: 1375 M

bio-climatic zone: sub-humid
species: 13
total n.° 584

SPECIES	84 N.°	85 %	85 H[cm]	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	88 Con
Acacia albida	48	71	45.2	44	28.4	42	58.7	35	70.8	3
Acacia cyanophylla	49	98	81.0	98	117.0	94	140.0	90	94.0	*)1-2
Acacia farnesiana	50	90	48.0	90	73.0	90	102.0	90	111.0	3
Acacia nilotica	45	80	23.9	56	58.6	56	74.6	56	71.2	3
Acacia salicina	49	88	40.0	88	90.0	88	140.0	86	164.0	1-2
Acacia senegal	27	26	—	7	—	7	—	7	—	3-4
Acacia tortilis	33	70	21.6	42	40.5	39	65.8	39	81.3	3
Bauhinia variegata	48	94	26.0	90	31.4	73	64.3	67	81.3	3-4
Caesalpinia spinosa	47	94	38.4	94	53.3	94	82.8	94	92.8	3
Casuarina stricta	43	40	56.2	40	79.8	33	130.9	33	132.9	4
Ceratonia siliqua	49	100	29.0	90	28.7	86	48.8	84	64.0	3
Chamaecytisus proliferus	47	81	62.0	81	97.0	75	89.0	75	131.0	2
Parkinsonia aculeata	49	88	37.0	86	55.5	76	74.0	67	89.8	3

*) = mixed-up individuals because of replanting

PLOT N.º: 10
SITE: MOROÇOS
Planted: 28/11/84 R : 400 mm
Exp.: SE F:<100 mm
Lith: Lapilli + Pozolana Alt: 1625 M

bio-climatic zone: semi-arid
species: 11
total n.º 355

SPECIES	84	85		86		87		88		
	N.º	%	H[cm]	%	H[cm]	%	H[cm]	%	H[cm]	Con
Acacia albida	32	34	—	19	35.0	3	40.0	0	—	—
Acacia cyanophylla	41	98	69.0	90	77.0	61	71.0	39	189.0	2-3
Acacia farnesiana	39	85	31.0	69	49.0	62	75.0	54	88.0	2
Acacia nilotica	33	70	36.0	58	47.0	52	48.0	48	49.0	3
Acacia tortilis	17	76	18.0	47	19.0	29	15.0	24	33.0	3-4
Atriplex nummelaria	20	100	86.0	100	113.0	100	120.0	100	124.0	1-2
Balanites aegyptiaca	30	53	16.0	33	32.0	27	21.0	13	32.0	3
Cassia sturtii	29	100	39.0	100	47.0	100	59.0	100	71.0	1-2
Chamaecytisus proliferus	37	86	58.0	70	100.0	35	105.0	11	130.0	3
Eucalyptus camaldulensis	38	100	97.0	100	114.6	95	137.1	87	178.0	1-2
Parkinsonia aculeata	39	92	26.0	69	50.0	56	49.0	54	52.0	3

PLOT N.º: 11
SITE: RIBEIRINHA
Planted: 28/11/84 R : 350 mm
Exp.: NNE/NW F:<1000 mm
Lith: Pyroclastic Alt: 1500 M

bio-climatic zone: semi-arid
species: 15
total n.º 622

SPECIES	84	85		86		87		88		
	N.º	%	H[cm]	%	H[cm]	%	H[cm]	%	H[cm]	Con
Acacia aneura	46	100	57.0	100	73.2	100	78.5	100	86.8	2-3
Acacia calamifolia	14	100	65.6	100	118.5	100	153.2	100	167.8	1-2
Acacia colleteoides	10	100	52.1	80	63.4	80	51.4	80	50.0	2
Acacia cyanophylla	50	100	82.5	100	117.5	100	147.5	92	176.7	2
Acacia victoriae	48	100	49.0	100	65.0	100	85.5	98	82.2	1-2
Bauhinia rufescens	35	14	12.0	0	—	0	—	0	—	—
Caesalpinia spinosa	49	98	57.0	98	96.5	92	122.0	88	131.9	3
Cassia sturtii	49	100	43.5	100	54.5	98	74.2	98	88.7	1-2
Casuarina stricta	42	98	94.8	95	119.9	90	135.0	81	193.0	3-4
Cupressus arizonica	48	94	66.9	94	81.3	92	108.0	90	137.0	2
Eucalyptus gomphocephala	46	98	92.5	95	145.1	93	179.3	89	218.8	1
Pinus canariensis	50	98	67.0	98	77.0	92	94.3	78	132.3	2-3
Prosopis tamaruga	44	52	17.3	23	34.0	2	5.0	2	10.0	4
Tamarindus indica	47	45	17.5	34	24.5	11	37.0	6	52.5	3-4
Zizyphus mauritiana	44	91	18.4	87	30.5	80	31.5	73	50.0	4

PLOT N.º: 12
SITE: MOROÇOS
Planted: 16/12/85 R : 400 mm
Exp.: S/SW F:<100 mm
Lith: Pyroclastic Alt: 1650 M

bio-climatic zone: semi-arid
species: 9
total n.º 425

SPECIES	85 N.º	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	Con
Acacia aneura	45	67	21.8	64	22.9	64	28.1	1
Acacia cyclops	46	80	31.1	70	53.9	70	75.9	2-3
Acacia nilotica	58	40	36.6	40	41.8	40	50.9	3
Acacia victoriae	38	84	20.6	89	49.4	92	74.8	2
Caesalpinia spinosa	50	82	23.0	64	47.3	64	67.5	3-4
Ceratonia siliqua	50	64	31.2	58	33.9	58	43.5	3
Cupressus arizonica	46	28	43.0	22	48.0	20	56.3	3
Pinus halepensis	42	69	47.4	48	48.8	41	60.7	2-3
Schinus molle	50	74	35.0	54	42.4	48	47.4	2-3

PLOT N.º: 13
SITE: RIBEIRINHA
Planted: 15/09/85 R : 375 mm
Exp.: NNE-NE F:<200 mm
Lith: Lapilli Alt: 1510 M

bio-climatic zone: semi-arid
species: 10
total n.º 398

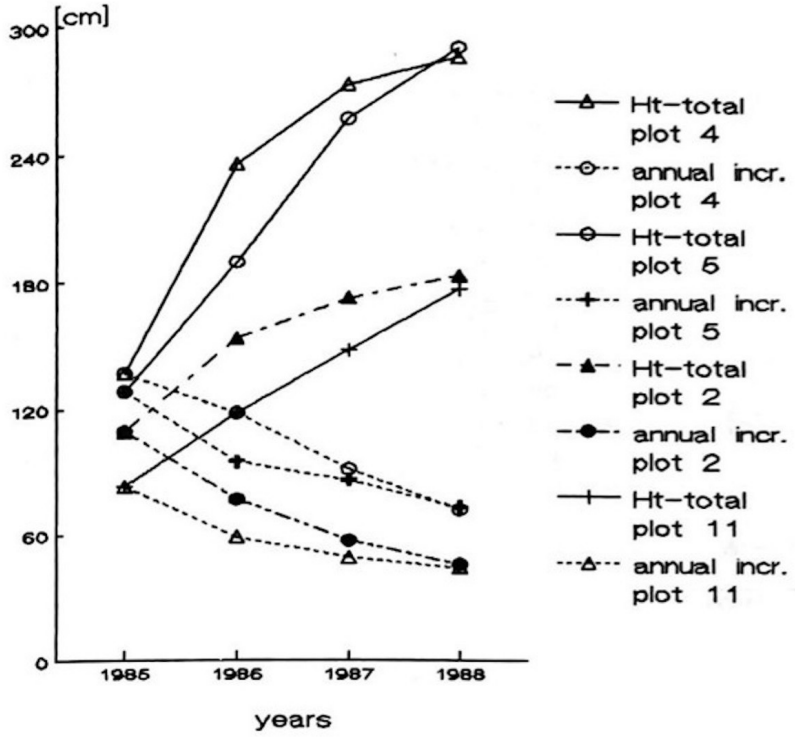
SPECIES	85 N.º	86 %	86 H[cm]	87 %	87 H[cm]	88 %	88 H[cm]	Con
Acacia cyclops	50	88	37.3	72	70.9	70	85.8	2-3
Acacia seyal	47	68	40.0	53	46.4	49	63.1	3-4
Ailanthus altissima	34	9	10.0	3	18.0	3	22.0	3
Atriplex halimus	28	93	85.5	93	103.9	86	151.0	2
Atriplex semibaccata	53	96	52.9	83	50.2	83	55.1	2-3
Atriplex sp. «erecta»	49	61	45.0	39	40.6	39	56.7	2-3
Atriplex sp. «vermelho»	31	55	49.8	52	61.8	52	71.1	2-3
Ceratonia siliqua	49	59	23.7	33	28.3	16	36.8	3
Chamaecytisus proliferus	9	11	34.0	0	—	0	—	—
Melia azedarach	48	58	43.8	35	54.7	31	97.1	3

PLOT N.°: 14
SITE: GUDO DOS MOROÇOS
Planted: 6/10/87 R : 450 mm bio-climatic zone: semi-arid
Exp.: N/NW F:<200 mm species: 14
Lith: pyroclastic Alt: 1600 M total n.° 585

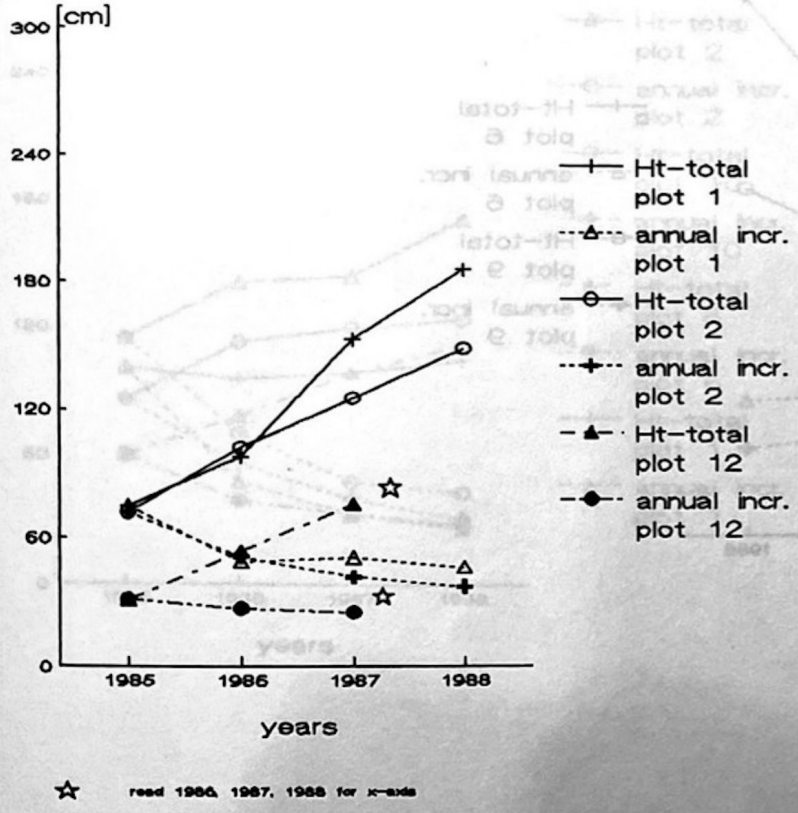
SPECIES	87 N.°	88 %	H[cm]	$\bar{Con}$
Acacia albida	20	60	27.2	3-4
Acacia aneura	40	98	57.0	2-3
Acacia cyanophylla	40	100	79.0	2-3
Acacia cyclops	30	93	84.0	1
Acacia farnesiana	50	90	52.0	2-3
Acacia holosericea	40	85	42.3	3
Acacia nilotica	47	96	39.0	3
Acacia seyal	29	90	49.2	3
Acacia victoriae	40	90	32.0	2
Atriplex nummelaria	65	88	68.4	3
Atriplex sp. «#2»	35	97	79.0	2-3
Cassia sturtii	50	100	44.0	1-2
Ceratonia siliqua	50	92	41.9	3
Parkinsonia aculeata	49	65	51.0	3

Appendix D. Graphs

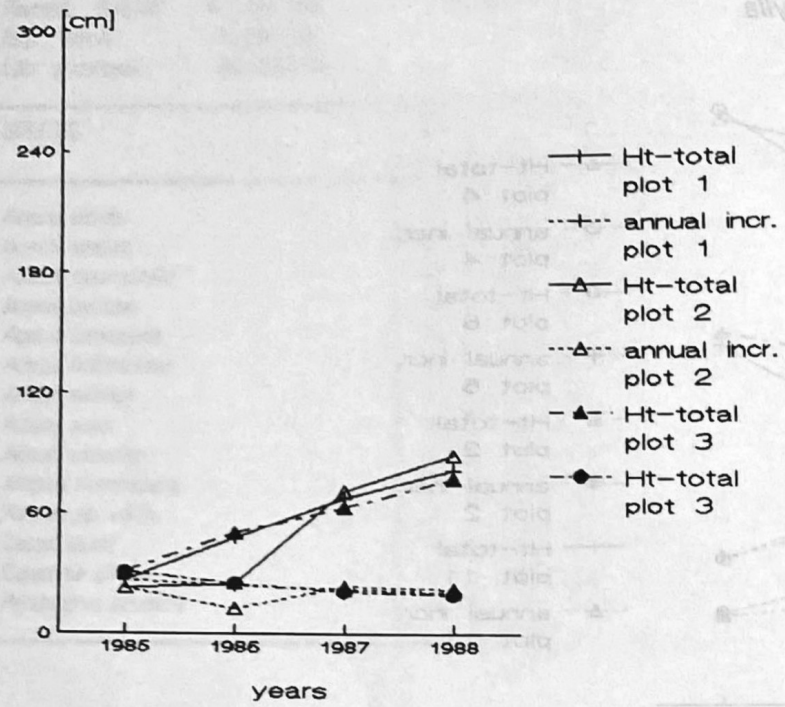
Acacia cyanophylla



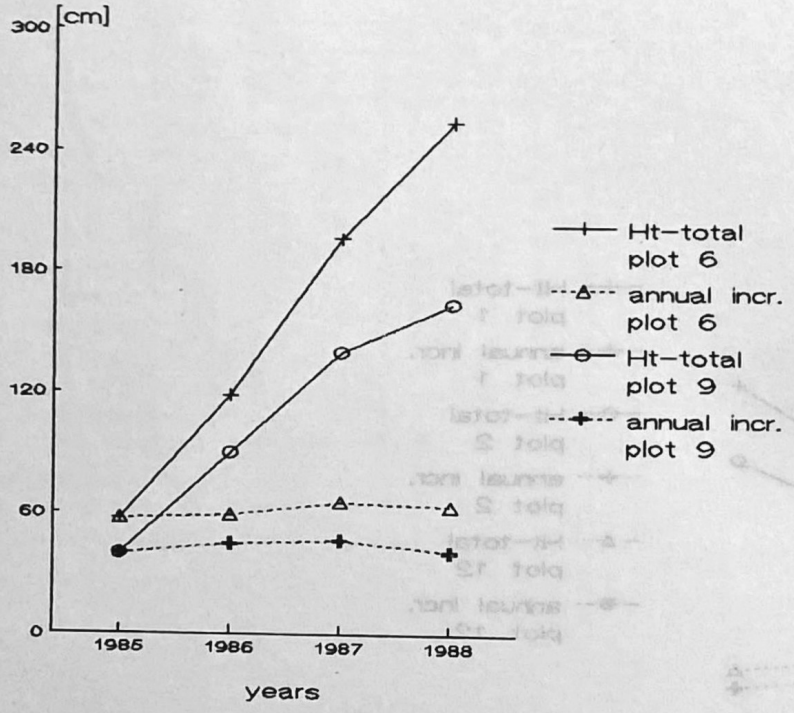
Acacia cyclops



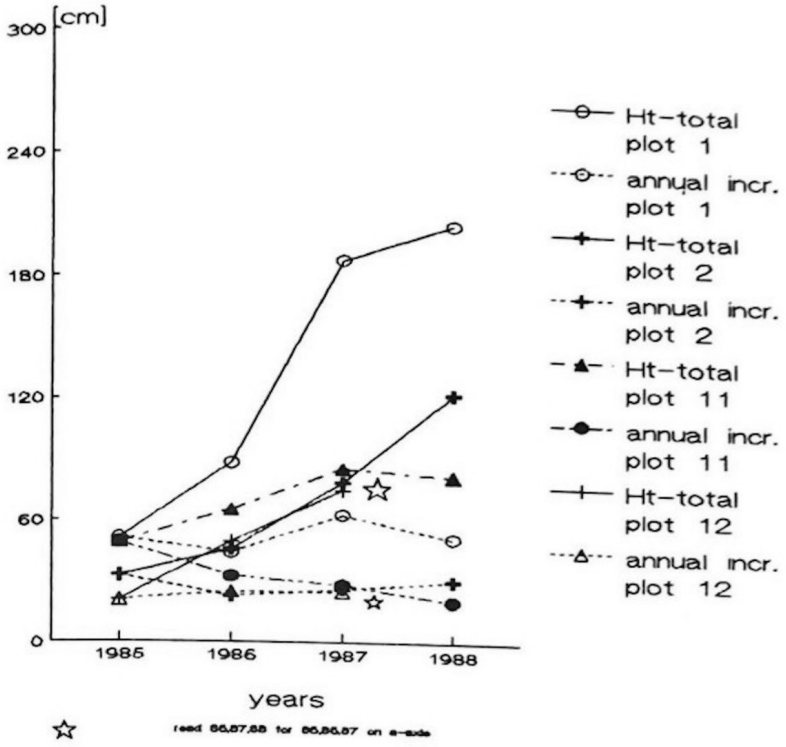
Acacia holosericea



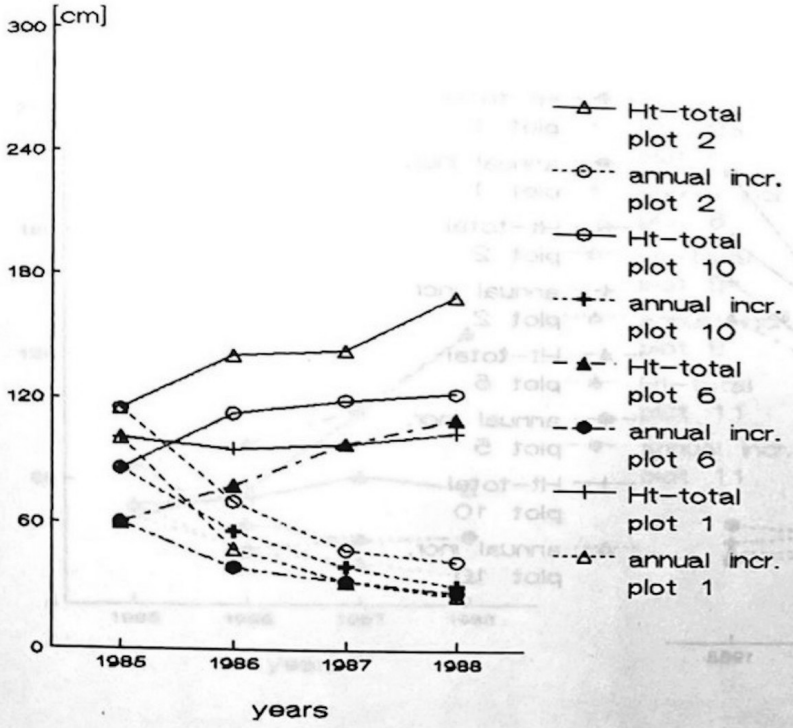
Acacia salicina



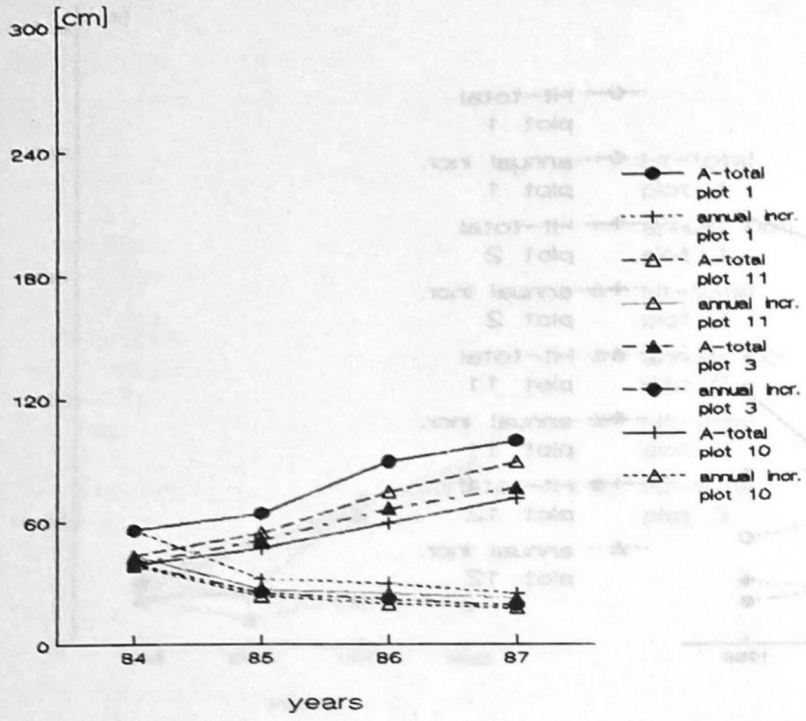
Acacia victoriae



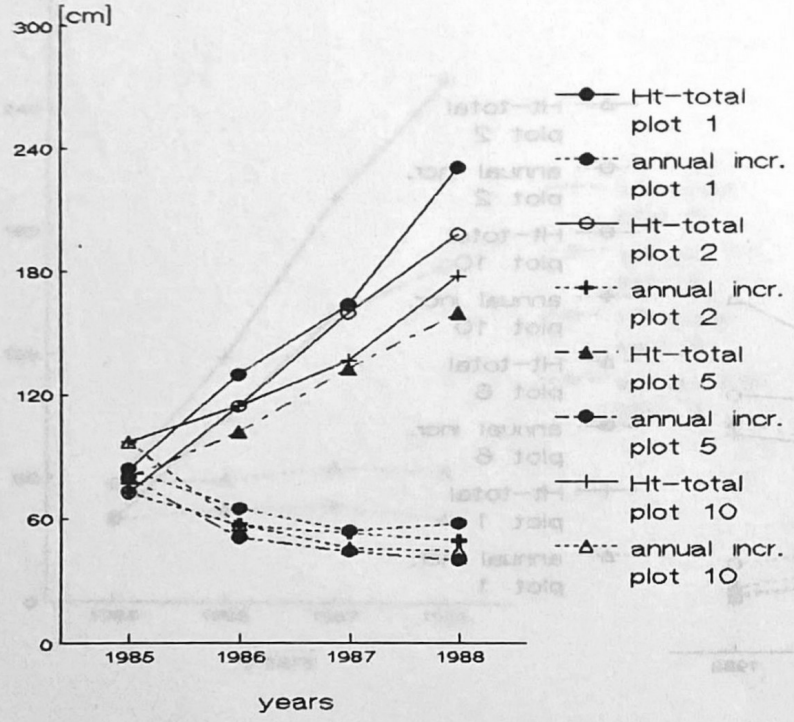
Atriplex nummelaria



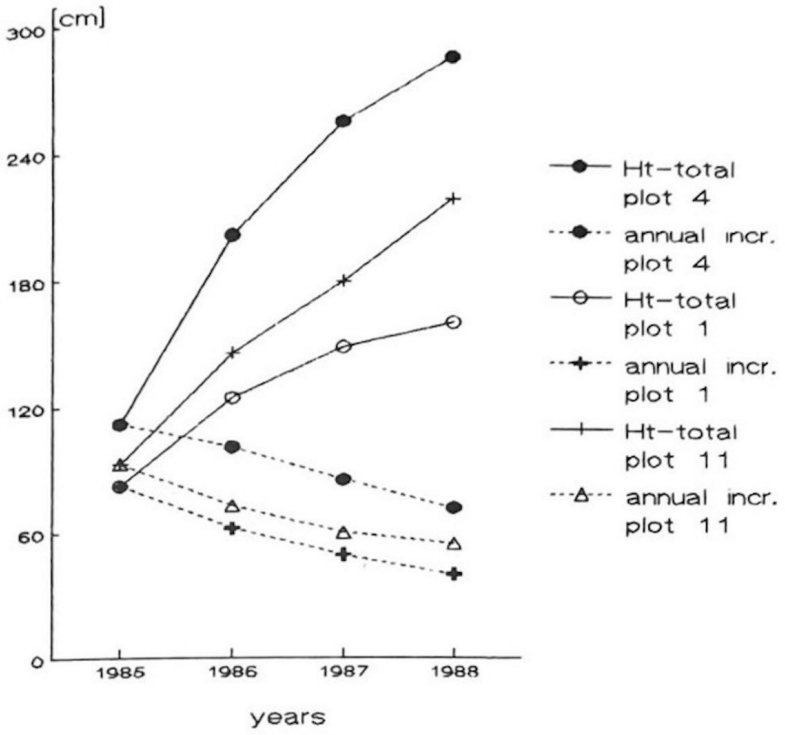
Cassia sturtii



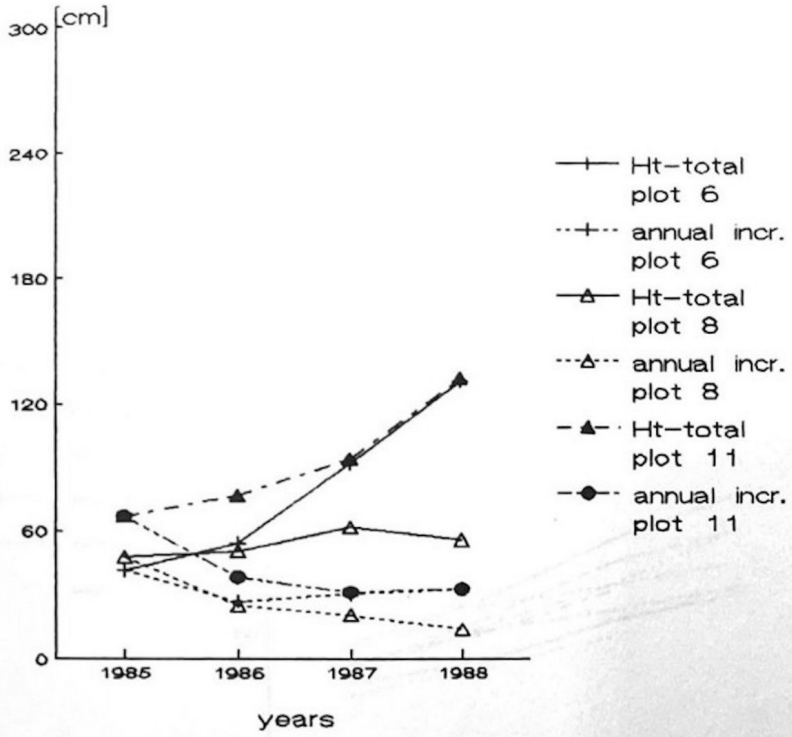
Eucalytpus camaldulensis



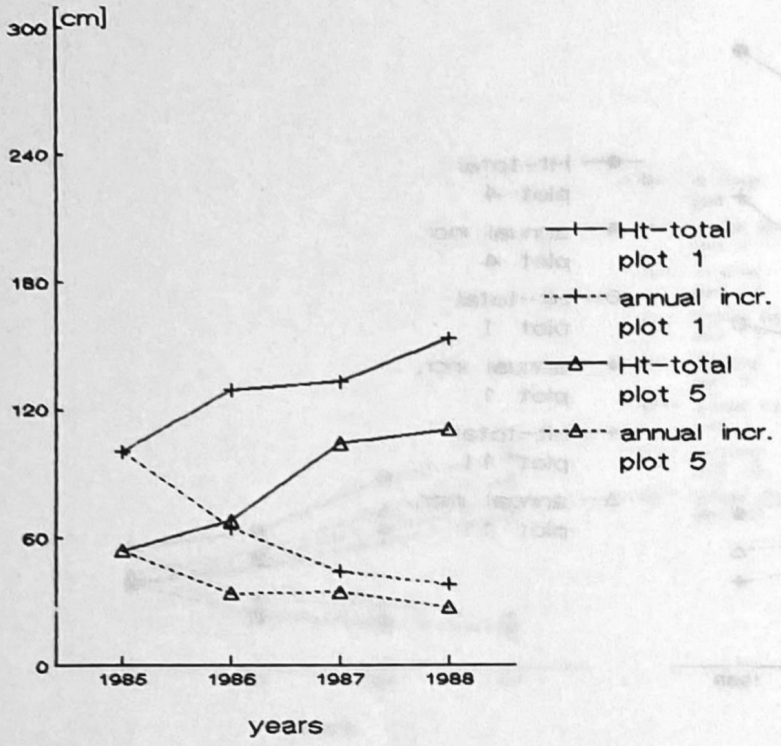
Eucalytpus gomphocepha

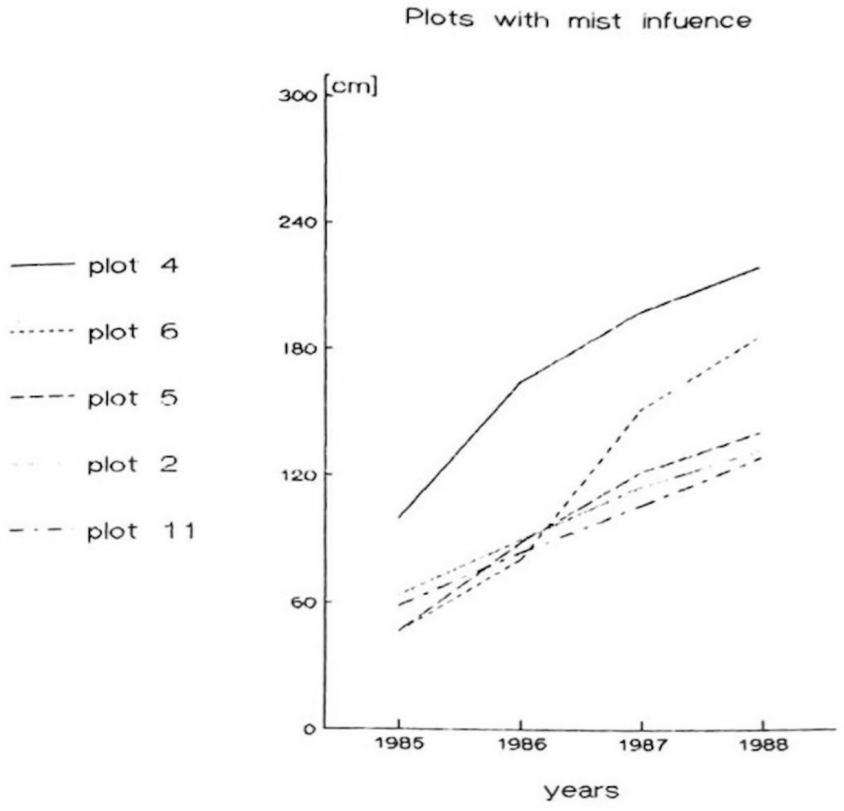


Pinus canariensis



Schinus molle





Average total height for all species per plot.