408

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ARBORICULTURE: SELECTION

TREE SELECTION STUDIES FOR REVEGETATION OF EXPOSED SITES AND AREAS OF DERELICTION

F. T. LAST

BUSH ESTATE
PENICUIK
MIDLOTHIAN

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CONTENTS

A. CUTTINGS

Phase IIA Vegetative propagation

Overwintering losses of cuttings were small; *Betula pubescens* had the best survival and *Alnus incana* the worst (Figure 1). However, when the different phases of propagation were examined, large clonal differences emerged (Figures 2, 3, 4 and 5). Where they occurred, major overwintering losses were confined to slow-rooting cuttings. Next winter, cuttings of these clones will be kept under lights in the hope of extending the periods of root formation.

Some glasshouse-grown plants of each clone, serving as stock plants, were kept under lights. These plants are being used to provide 'early' cuttings to accelerate the build up of clonal planting stock. A number of the stock plants unexpectedly died; to minimize the risk of further losses, the survivors were transplanted to fresh compost.

Phase III Symbiotic associations

When examined at transplanting there were no obvious mycorrhizas or nodules. A second examination will be made and inoculation procedures checked.

Phase IV Field trials

Spoil beds have been constructed (Figure 5); they are lined with heavy duty plastic, and have a basal layer of sand. Three substrates are being tested:

(a) Alkaline washery waste from Bilston Glen Colliery (nr. Edinburgh)
(b) Acidic spoil from Roslin old-bing (nr. Edinburgh)
(c) Local soil at ITE Laboratory (nr. Edinburgh)

For the present only one bed is being constructed for each substrate and therefore experimental differences between beds will not be statistically valid. Nonetheless they should provide pointers for future developments and will enable the retention and build-up of tolerant stocks. The spoil beds, to minimize edge effects, are about to be protected by windbreaks.

B. SEEDS

Phase II Germination tests

In preliminary experiments treating birch seeds with the fungicide Captan did not increase germination and subsequent survival. On the contrary, the fungicide was associated with an appreciable decrease when germinating on spoil - the decrease, however, was not statistically significant.

Curiously the germination of some birch seed was greater on lead spoil than on local spoil (Figure 7).

C. SPOIL ANALYSES

Conductivity, total nitrogen, potassium, calcium and magnesium were analysed from a 2:1 water:: spoil extract. Phsophorus was analysed from a 50:1 0-IM KCI solution (Tables 2, 3 and 4). Results of Al, Fe, Cu, Mn, Pb and B analyses are awaited.

D. ANCILLARY EXERCISE

Factors influencing the silvering of birch. As trees are being selected for amenity characters in addition to survival on spoil, the chance was taken to investigate silvering in an even-aged stand of birch. Using a subjective scale:

Silvering grade	1	Green/purple bark
	2	Shiny purple bark
	3	Brown/purple bark
	4	Brown/silver bark
	5	Silver bark

it was found, within the same seed population, that the early development of silvering was associated with rapid stem expansion. Thus the selection of rapid growers may automatically select for early silvering; on the other hand more intensive selection will be needed to find silvering on slow growers.

TABLE 1 SPOIL ANALYSES SITES IN DURHAM

AN	VEGETATION	SITE	pH	Total N ppm	P ppm	K ppm	Ca ppm	Mg ppm	Cond. µs
5	V }	Alexandria	5.1	ND	4.7	-	19	8.5	-
6	NV }	"	5.0	ND	2.0	-	21	8.4	160
7	V }	"	5.1	ND	2.7	-	47	22.0	-
8	NV }	"	4.0	ND	.5	11.0	10	6.5	160
9	V	"	5.9	.3	18.0	96.0	62	23.0	380
10	V	"	7.8	.2	6.5	35.0	120	35.0	400
11	V	"	8.0	ND	9.3	45.0	120	25.0	340
12	V }	Wylam	4.0	ND	2.0	21.0	93	39.0	540
13	NV }	"	3.7	1,7	ND	1.4	24	8.4	380
14	V }	"	4.6	ND	2.1	13.0	25	9.1	180
15	NV }	"	3.8	.7	ND	5.0	20	9.1	160
16	V }	"	5.7	-	.51	6.3	22	7.0	75
17	NV }	"	4.5	1.0	2.0	6.4	17	6.5	90
18	V }	"	4.1	ND	.51	10.0	7.1	2.0	120
19	NV }	"	3.9	ND	ND	5.1	7.2	1.3	90
20	V	"	5.1	ND	7.4	-	38	11.0	-
21	V	W. Sleekburn	4.2	ND	1.6	62.0	570	200.0	1500
22	V }	"	6.2	ND	1.5	35.0	100	46.0	330
23	NV }	"	6.5	ND	5,1	-	690	380.	2400
24	V	"	6.5	.3	1.0	50.0	610	18 .	1700
25	V	"	6.4	.2	13.0	46.0	130	560.	540
26	V	"	6.0	.3	ND	49.0	290	110.	540
27	V }	"	6.2	.03	2.5	65.0	700	330.	1400
28	NV }	"	7.0	ND	ND	58.0	1000	550.	4100

V = Spoil from around trees

NV = Spoil at a distance from trees (non-vegetated)

ND = Non detectable

\- = insufficient sample

Analyses of spoil sampled to a depth of 10 cm

(See table 1 of first report)

TABLE 2 SPOIL ANALYSES SITES IN YORKSHIRE

AN	VEGETATION	SITE	pH	Total N ppm	p ppm	K ppm	Ca ppm	Mg ppm	Cond. µs
30	V	Alma	4.2	ND	0.51	-	76.0	22.0	190
31	NV	"	2.6	0.4	ND	1.2	190.0	100.0	2400
33	V	"	3.7	3.5	ND	22.0	300.0	13.0	270
32	NV	"	3.8	0.4	ND	26.0	17.0	8.1	230
34	V	"	3.7	0.2	ND	38.0	31.0	12.0	170
35	V	"	3.8	0.1	ND	28.0	16.0	6.4	170
36	V	"	4.0	0.1	ND	31.0	23.0	6.6	200
37	V	"	4.3	ND	ND	20.0	8.0	2.9	130
38	NV	"	3.8	1.1	ND	25.0	23.0	13.0	390
39	V	"	3.9	0.2	ND	27.0	17.0	7.9	250
40	NV	"	3.9	1.1	ND	27.0	18.0	6.9	130
41	V	Codnor	-	-	6.3	-	12.0	42.0	630
42	V	"	3.0	-	80.0	30.0	56.0	18.0	120
43	V	Brinsley	8.6	12.0	6.3	86.0	110.0	38.0	1100
44	V	"	8.3	90.4	ND	83.0	230.0	76.0	900
45	V	"	2.3	ND	ND	23.0	22.0	11.0	140
46	V	"	2.8	0.2	6.8	28.0	16.0	5.7	84
47	V	"	2.4	0.1	0.52	24.0	31.0	18.0	300
48	NV	"	2.4	0.3	ND	24.0	26.0	10.0	120
49	V	Round-wood	6.1	0.1	12.0	61.0	270.0	90.0	630
50	V		7.2	0.1	9.6	72.0	96.0	37.0	450
51	V	"	9.8	24.6	34.0	98.0	84.0	20.0	550

TABLE 3 SPOIL ANALYSES SITES IN SCOTLAND

AN	VEGETATION	SITE	pH	Total N ppm	P ppm	K ppm	Ca ppm	Mg ppm	Cond. µs
55	V	Newton Grange	4.2	0.8	ND	14	15.0	19.0	250
56	NV		3.5	1.9	ND	8.9	5.6	8.3	130
57	V	"	4.2	ND	ND	5.1	6.6	3.3	110
58	NV	"	4.4	1.3	ND	3.9	16.0	19.0	450
59	V	"	4.6	ND	ND	9.6	6.8	1.8	83
60	NV	"	4.2	ND	ND	5.1	5.8	1.4	81
61	V	"	4.8	ND	0.51	30.0	7.7	6.8	86
62	NV	"	4.6	0.6	ND	13.0	1.6	2.0	50
63	V	"	3.6	1.4	ND	6.7	4.6	10.0	160
64	NV	"	4.0	1.3	ND	6.8	4.6	6.6	130
70	V	L. Ore	3.3	0.1	ND	16.0	7.0	3.4	38
71	NV	"	5.3	1.6	ND	15.0	4.6	3.2	54
72	V	"	6.1	ND	1.0	12.0	7.6	7.4	51
73	NV	"	6.1	ND	1.0	7.9	6.7	5.3	70
74	V	"	4.8	ND	0.51	14.0	3.5	2.3	47
75	V	"	4.5	ND	6.2	-	31.0	8.3	63
76	NV	"	4.8	0.1	0.51	8.7	2.6	2.1	43
77	V	Woodhall	4.6	0.03	ND	24.0	220.0	12.0	380
78	NV	"	5.0	0.03	0.51	15.0	170.0	19.0	340
79	V	"	6.3	ND	5.6	16.0	34.0	3.9	2000
80	NV	"	3.8	ND	0.5	18.0	1200.0	24.0	130
81	V	"	6.0	ND	6.1	21.0	46.0	4.0	850
82	NV	"	3.7	0.1	ND	22.0	300.0	52.0	430
83	V	"	4.9	0.1	ND	17.0	330.0	75.0	810
84	NV	"	3.9	0.1	ND	9.4	9.1	2.3	56

Fig. 1

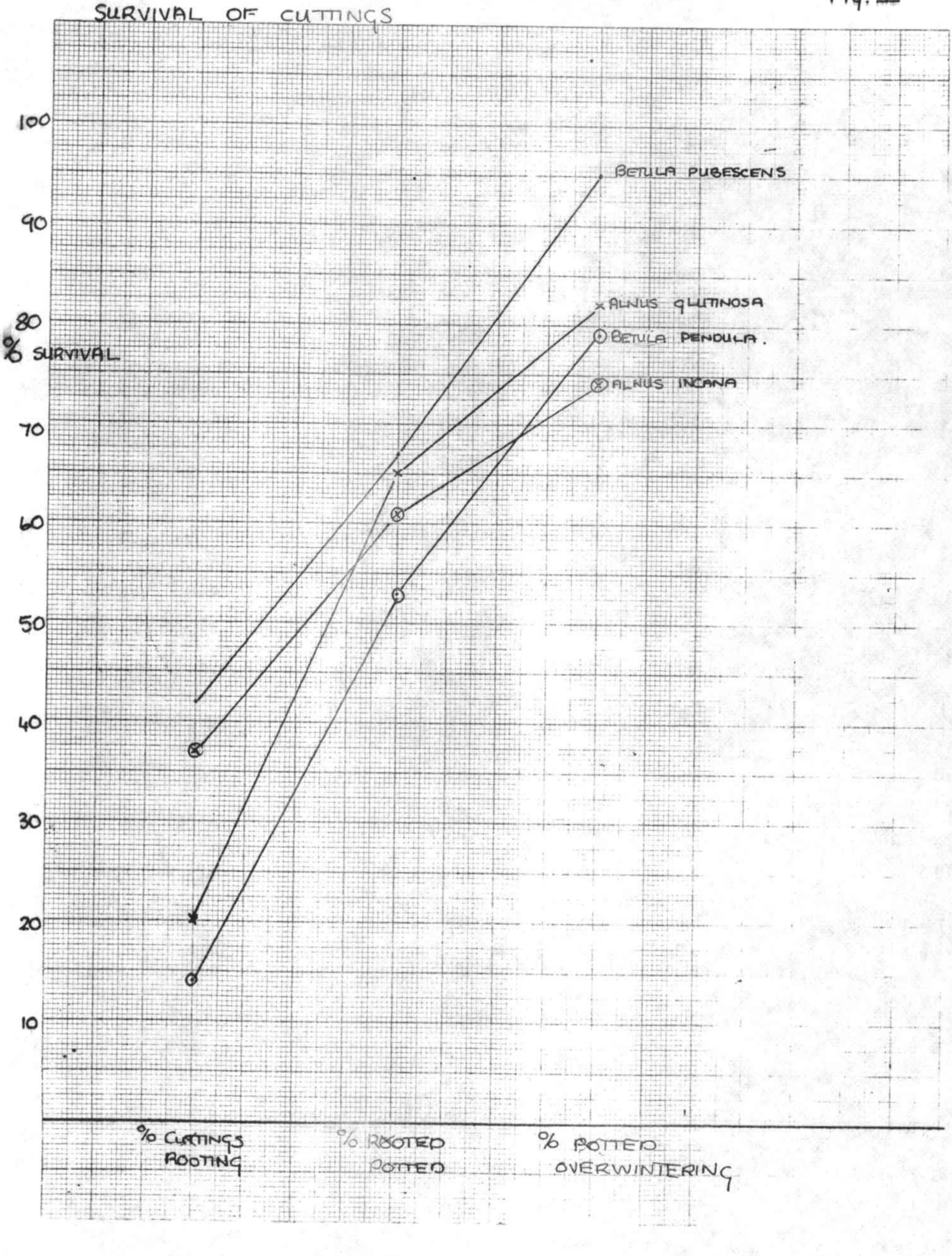

SURVIVAL OF CUTTINGS
100
90
80
70
60
50
40
30
20
10
% SURVIVAL
BETULA PUBESCENS
ALNUS GLUTINOSA
BETULA PENDULA.
ALNUS INCANA
% CUTTINGS ROOTING
% ROOTED POTTED
% POTTED OVERWINTERING

FIG. 2

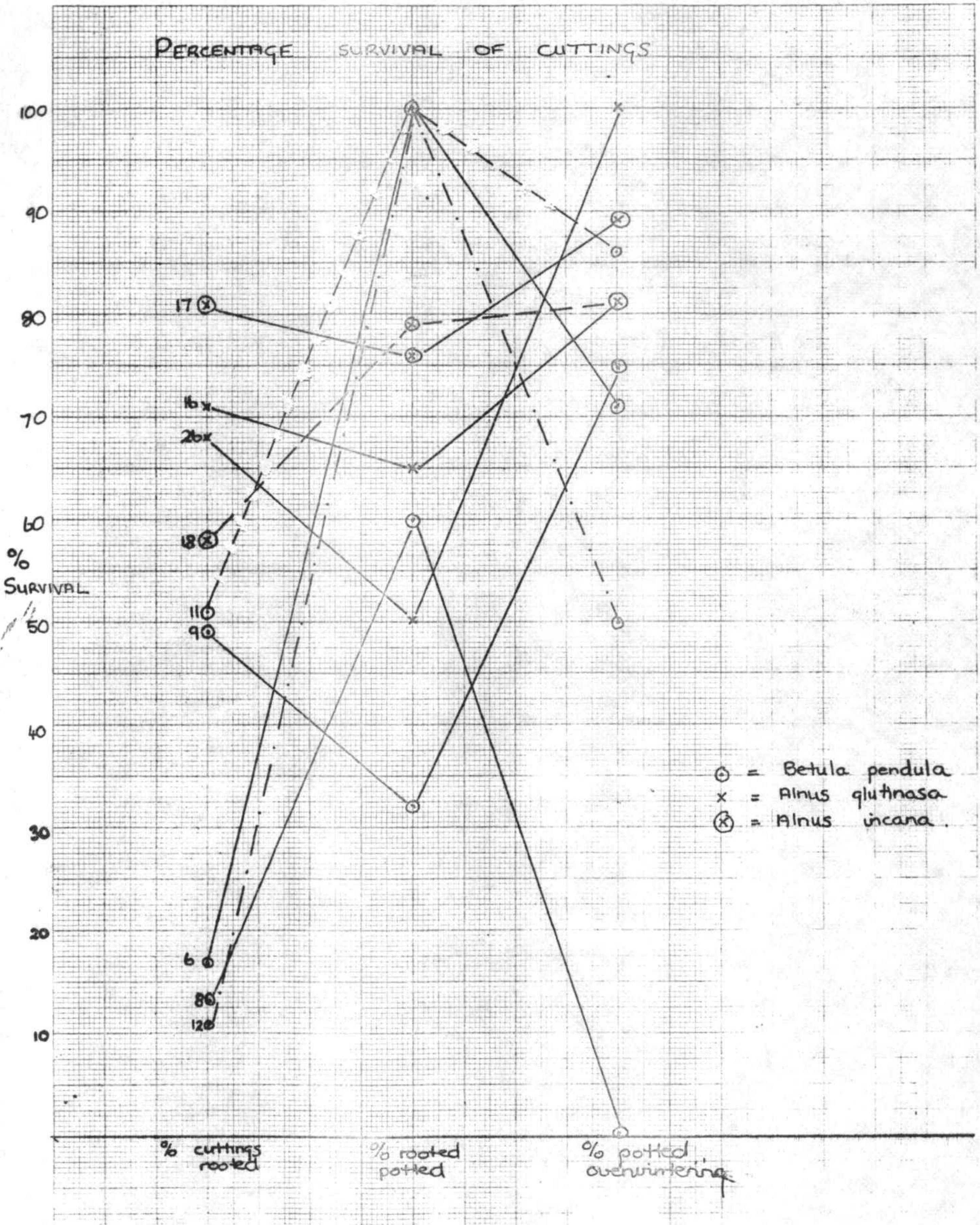

PERCENTAGE SURVIVAL OF CUTTINGS
100
90
80
70
60
50
40
30
20
10
% SURVIVAL
17
16
26
18
11
9
6
8
12
% cuttings rooted
% rooted potted
% potted overwintering
⊙ = Betula pendula
x = Alnus glutinasa
⊗ = Alnus incana.

Fig. 3

PERCENTAGE SURVIVAL OF CUTTINGS.

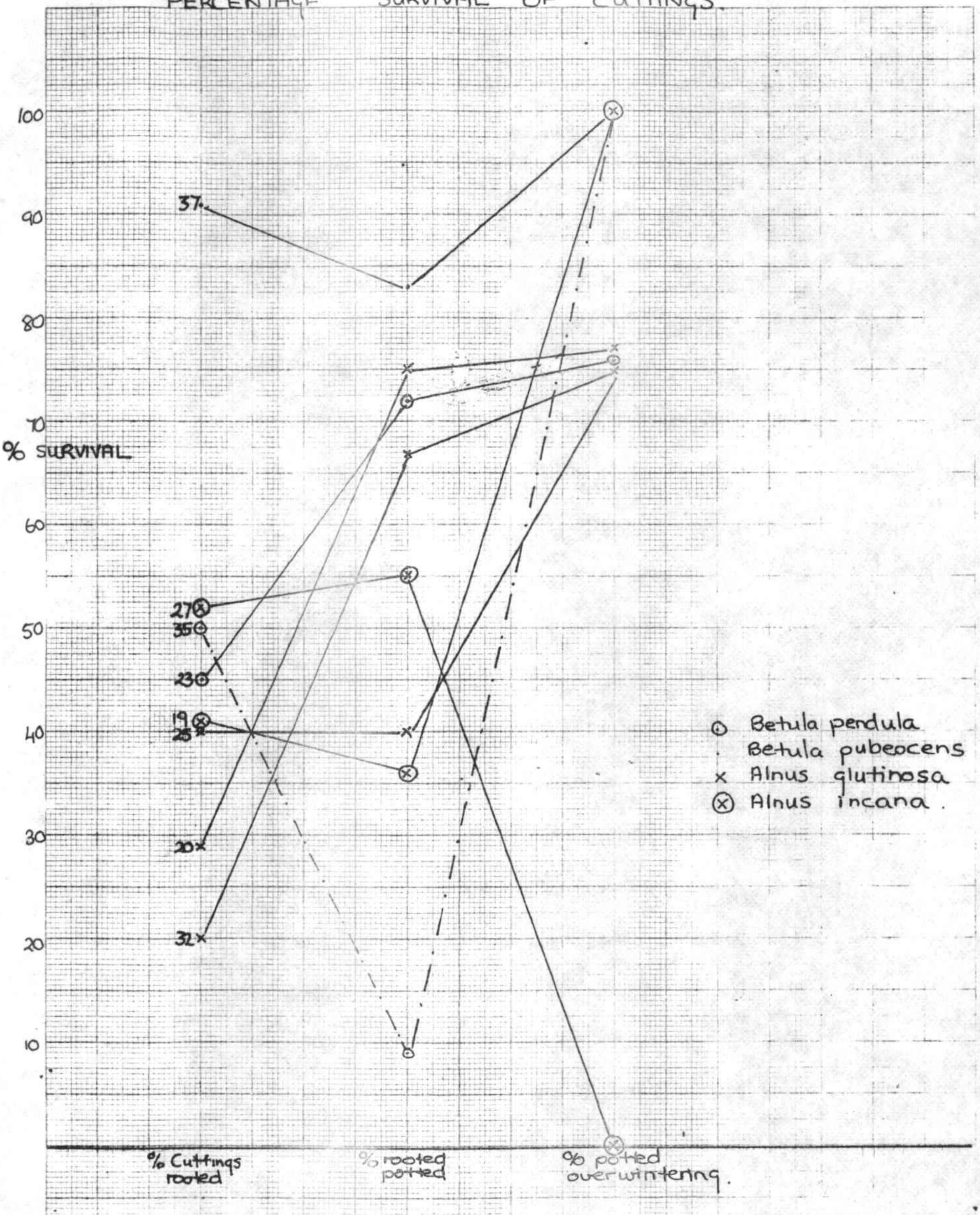
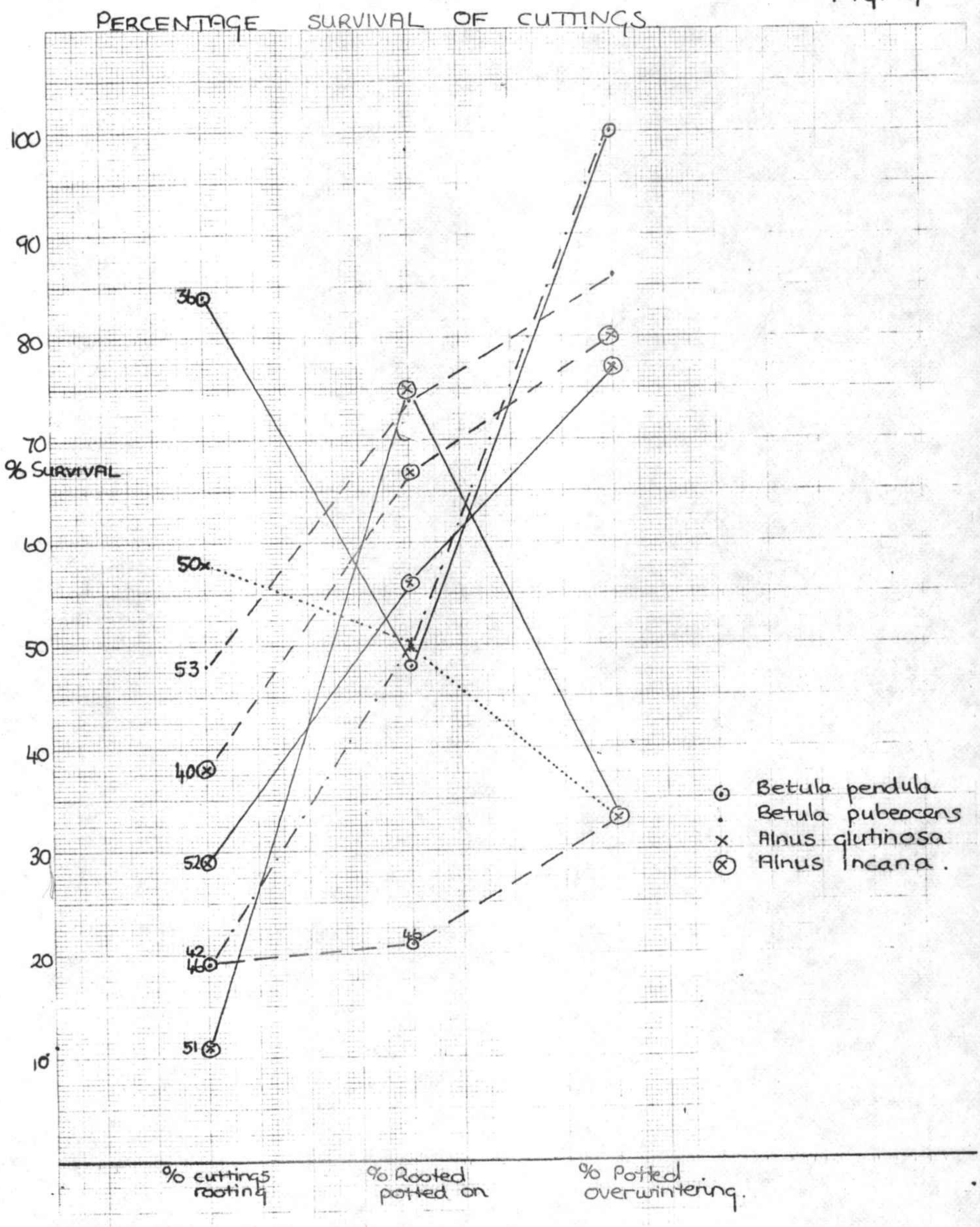
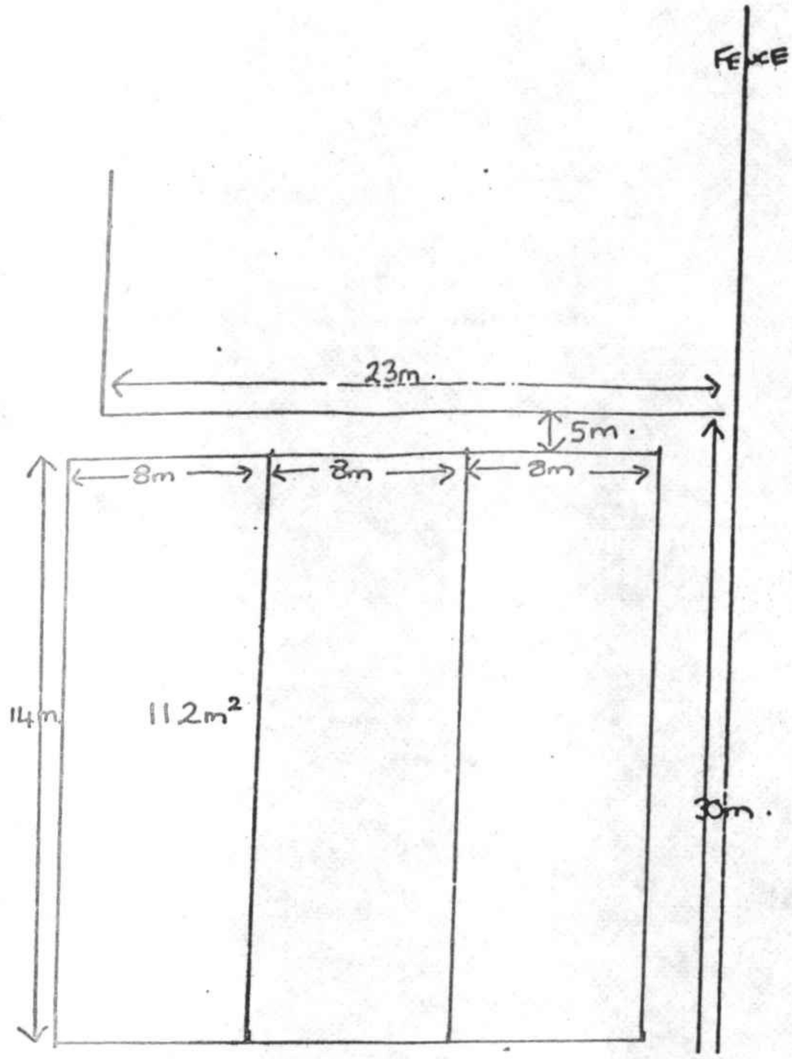
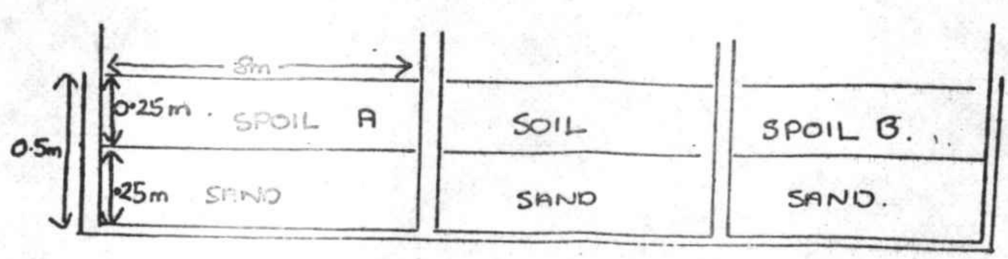


Fig. 4



PERCENTAGE SURVIVAL OF CUTTINGS
% SURVIVAL
100
90
80
70
60
50
40
30
20
10
36
50x
53
40
52
42
46
51
46
% cuttings rooting
% Rooted potted on
% Potted overwintering.
Betula pendula
Betula pubescens
Alnus glutinosa
Alnus incana.


FENCE
23m.
5m.
8m
8m
8m
14m
112m²
30m.


8m
0·25m
SPOIL A
SOIL
SPOIL B.
0·5m
·25m
SAND
SAND
SAND.

EFFECT OF CAPTAN ON GERMINATION OF BETULA PENDULA

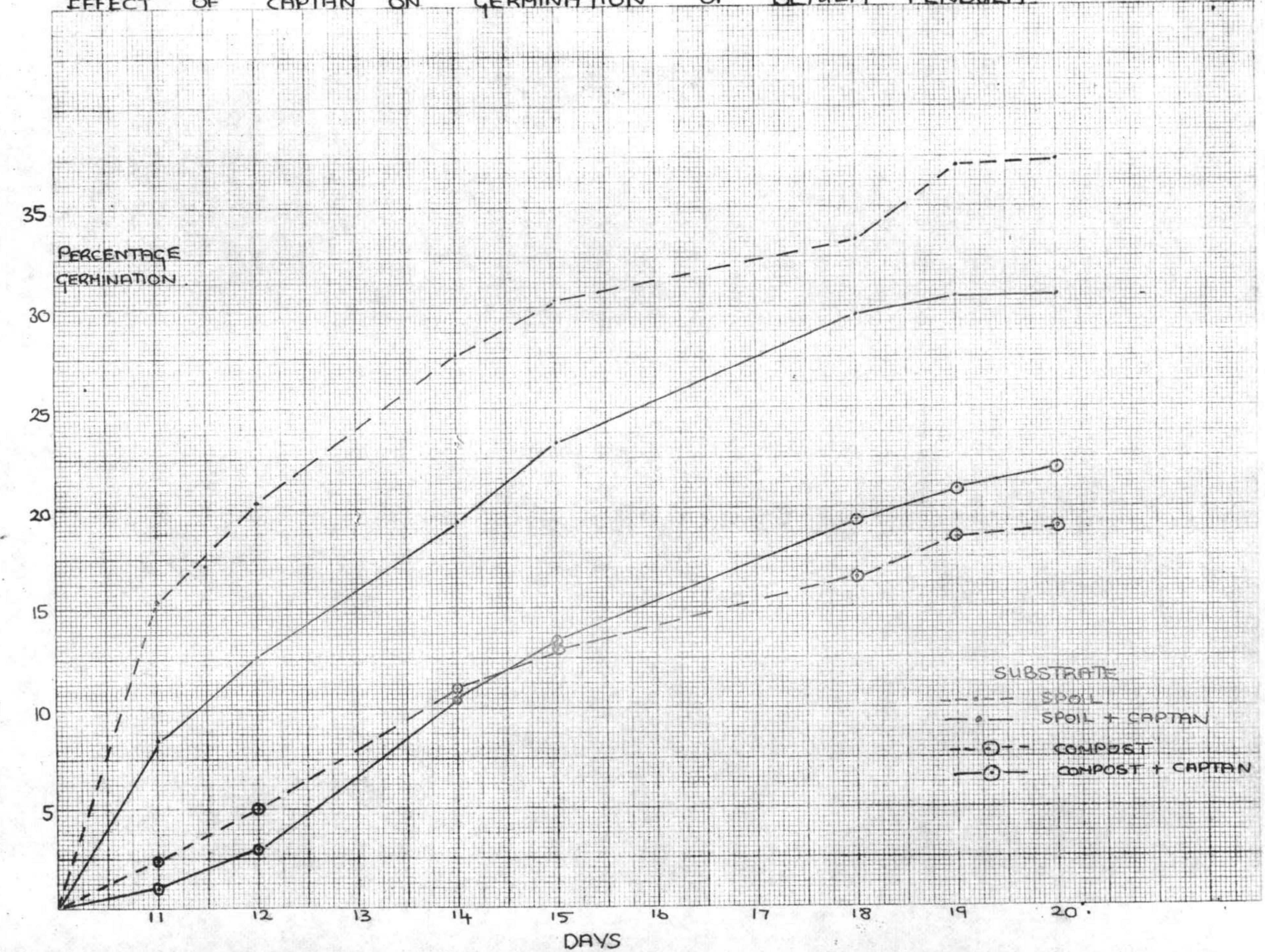


FIG 7

GERMINATION OF TWO BIRCH (BETULA PENDULA) SEED LOTS ON LEAD SPOIL

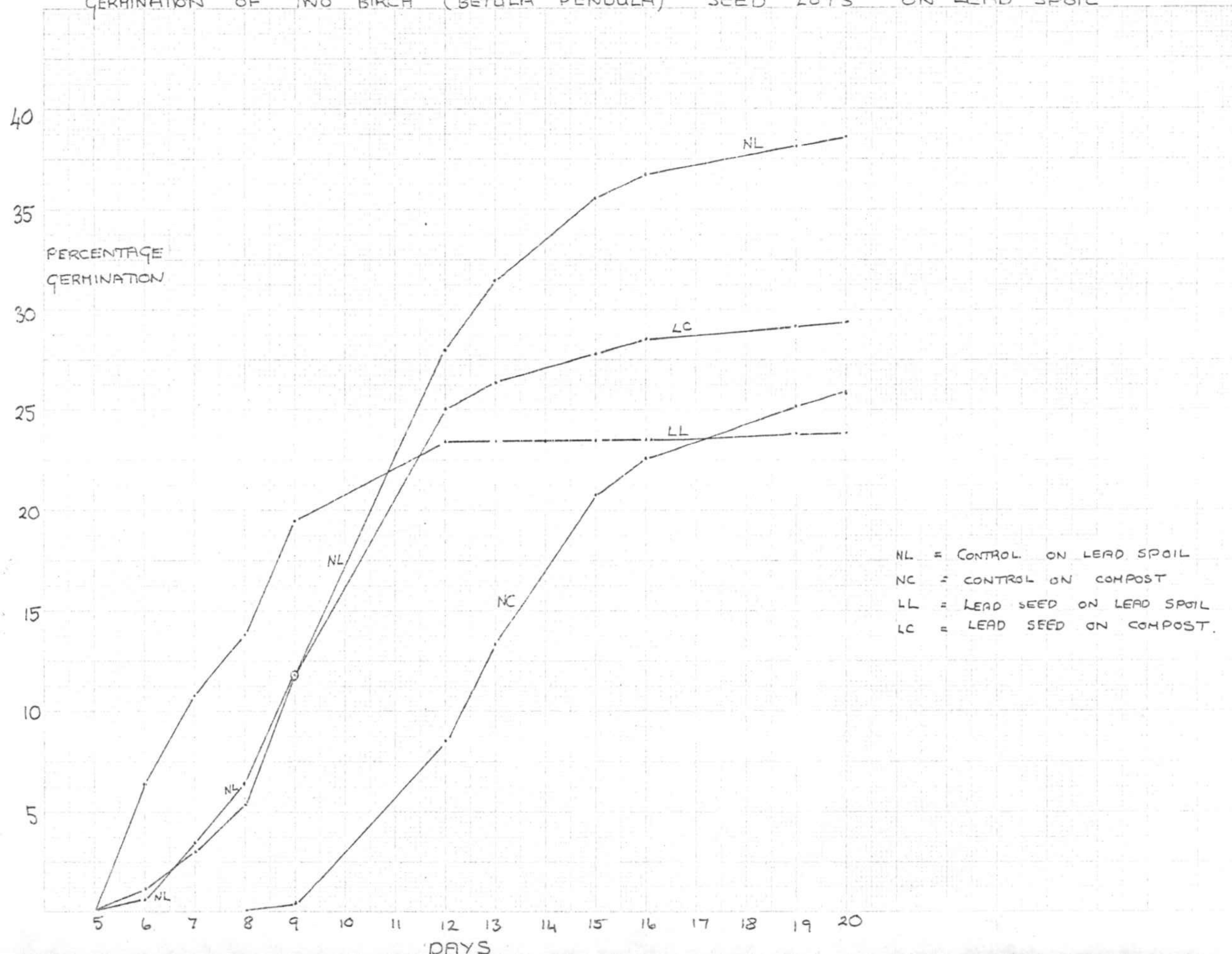
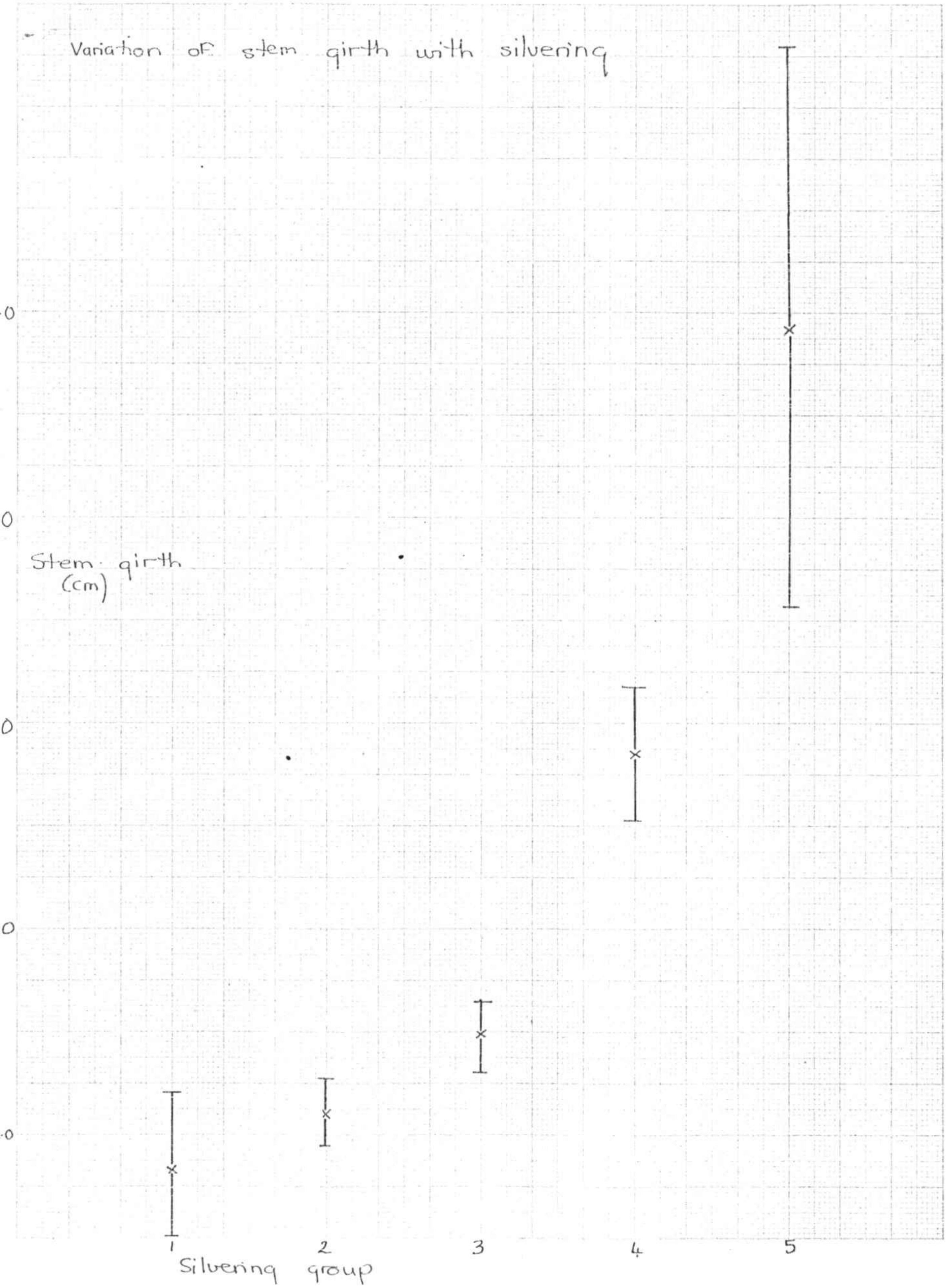


Fig. 8


Variation of stem girth with silvering
Stem girth
(cm)
1
2
3
4
5
Silvering group