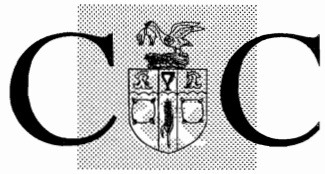
CONFIDENTIAL R&D REPORT NO. 25

Summary of Results of Green Bean Variety Trial 1995

March 1996

Campden & Chorleywood
Food Research Association



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Summary of Results of Green Bean Variety Trial 1995

Dr. Richard Stanley

March 1996

SUMMARY

Results are presented of a variety trial of seventeen varieties of green beans grown on a silt soil in Warwickshire in 1995. The trial was grown in a very hot dry season and records of yield are particularly low. Plots were harvested using a single row ASA lift machine.

Control varieties were Nerina, Labrador, Lasso and Masai, the trial was drilled on 16th June 1995 and harvesting began on 20th August. Irrigation was provided, but despite good early establishment many varieties failed to thrive. The best yields came from Nerina and Tiber. Sensory results showed that the flat podded Tiber was pale green, Flexo and Corumba were bright medium green, Morgane was the most stringy and R6027 had a good bean flavour.

CONTENTS

INTRODUCTION

The evaluation of field performance and processing quality of dwarf green beans (*Phaseolus vulgaris*) has been reported for many years at CCFRA; these reports have more recently included the sensory assessment of samples harvested for fresh market use. In 1995 variety trials of dwarf green beans were carried out by CCFRA and the results are presented.

METHODS

Agronomy

In 1995 a trial of seventeen varieties of dwarf green beans was grown on a free draining light silt soil near Clifford Chambers in Warwickshire. Nerina, Labrador, Lasso and Masai were control varieties.

The trial was drilled on 16th June with four 20 metre rows of each variety in two replicates with a 450mm row spacing to give a target field population of 30 plants/m^2. The seed bed at drilling was moist and emergence was rapid and uniform; rainfall was very low during June, July and August and temperatures were above average. Soil moisture was maintained by irrigation but was not sufficient to establish a vigorous crop. Weed control was successful using Aressin (a.i. monolinuron). Aphid infestation was observed, and this was controlled using Decis (a.i. Deltamethrin). Details are summarised in Table 1.

Harvesting

Harvesting began on 22nd August using an ASA Lift GB100 single row harvester. Both replicates of the trial were harvested on each harvest date. Varieties which were assessed to be at a suitable stage for fresh market or freezing maturity were retained for botanical measurements, processing and sensory assessments. Plots which were not at a stage for commercial harvest were recorded for yield and the sample was discarded. A guide to seed length and maturity is given in Table 2. Yields were very low due to the excessively high temperatures and lack of rainfall. In some plots, flowers had not set pods and some plants

had few or no pods. In some varieties the plants were very short and failed to develop any vigour as the hot weather continued. There were not sufficient pods of good quality available for shelf life tests to be carried out.

The botanical assessments included measurement of pod length and width, straightness of pods and pod colour. Scores were also given for the condition of the harvested pods to indicate the level of damage and clusters.

Photocopies of samples of the pods were taken to provide a record of size and shape.

Processing

Beans for freezing were snibbed mechanically, blanched for one minute at 97°C in tap water and cooled. Cut pieces (25mm) were prepared using an Urschel cutter. Short podded types were processed whole. Blanched beans were frozen for 5 min at -36°C, packed into polythene bags and stored at -18°C.

Quality Appraisal

Quality assessment of fresh and frozen samples was carried out using a revised version of the QAV method described in Adams, M.J.Bedford, L.V, Geering J. (1981) Q.A.V:A method for the sensory appraisal of quality of processed vegetable varieties. Technical Memorandum No 278 (revised) Campden Food & Drink Research Association, Chipping Campden, Glos. The scoring system is summarised in Table 3. Replicated samples of each variety were assessed by a panel of three tasters and the results analysed using the Mann Whitney U test for nonparametric comparisons.

SUMMARY OF VARIETY PERFORMANCE

Nerina, Royal Sluis

A commercially grown variety of intermediate pod length (113mm) and a pod width of 9.9mm with moderate yield of beans of uniform medium dark green colour with slightly weak bean flavour. Harvest performance was satisfactory with some clusters in the sample.

Labrador, Asgrow

A variety of similar pod size and colour to Nerina. Plot yield was lower than Nerina; harvest performance was satisfactory with clean straight pods in the sample.

Lasso, Pop Vriend

A short pod variety (91mm) with finer pods than Nerina (8.6mm). Yield was lower than Nerina; plants were short and pods touched the soil. Fresh samples were paler green and brighter than Nerina with weaker flavour.

Masai, S&G Seeds

A short podded fine variety (93mm x 6.7mm) which had lower yields than Nerina. Plants were short and pods touched the ground. Harvest performance was satisfactory. Pods were a few days later in maturing than Nerina. Pod colour was paler green than Nerina; texture and flavour were similar to Nerina.

Flexo (B314), Asgrow

An intermediate pod length type with slightly finer pods than Nerina. Yield was lower than Nerina; plants were short and pods touched the soil. Harvest performance was satisfactory. Frozen samples were paler and brighter than Nerina.

Boreal, Asgrow

A short podded variety similar in length to Lasso but slightly finer. Yield was lower than Nerina, plants were short and many pods touched the soil. Samples were paler in colour than Nerina.

XPB 344, Asgrow

A short fine podded variety similar to Masai with lower yield than Nerina. Frozen samples were paler in colour than Nerina but similar in flavour and texture.

Matador, Asgrow

An intermediate variety similar to Nerina with lower yield. Pods were a few days later maturing than Nerina. Fresh and frozen samples were similar to Nerina.

Paulista (RS 1377), Royal Sluis

An intermediate variety similar in pod size to Nerina with lower yield. Fresh and frozen samples were similar to Nerina.

Sapporo (RS 1508), Royal Sluis

An intermediate variety with slightly finer pods than Nerina and lower yield. Fresh and frozen samples were similar to Nerina.

Corumba (RA 1246), Royal Sluis

An intermediate type pod with finer pods than Nerina and lower yield. Plants were very short and many touched the ground. Frozen samples were yellower and brighter than Nerina.

Tiber (CLX 2830), Clause

A flat podded variety which gave a higher yield than Nerina. Pods were pale green and plants were of medium height with good harvest performance. Fresh and frozen samples were paler, yellower and brighter than Nerina with similar texture and flavour.

Morgane, Clause

A long podded variety which matured rapidly to produce pods containing much fibre. Samples were taken two days earlier than Nerina but were already overmature. Harvesting performance showed several clusters in the sample. Fresh and frozen samples were very stringy in texture.

CLX 2305, Clause

An intermediate pod type with slightly longer and fatter pods than Nerina and low yield. Plant growth was vigorous but few pods were set. Fresh samples were bright in colour with similar texture and flavour to Nerina.

R6027, S+G Seeds

An intermediate variety with slightly longer pods than Nerina; plants were short and yield was lower than Nerina. Frozen samples had a good bean flavour, and were sweeter and stronger than Nerina with similar texture and colour.

R2328, S+G Seeds

An intermediate variety with shorter, thinner pods than Nerina. Plants were short and yield was lower than Nerina. Fresh samples were yellower in colour than Nerina but similar in texture and flavour.

R2634, S+G Seeds

An intermediate type similar to Nerina in pod size with lower yield. Plants were short and harvest performance showed several clusters in the sample. Fresh and frozen samples were similar to Nerina.

GREEN BEAN VARIETY TRIAL 1995

TABLE 1

AGRONOMIC DETAILS

Drilling date	16th June
Fertiliser	350kg/ha 11:5:18 NPK
Herbicide	Treflan 15th June Aressin 25th June
Insecticide	Decis 10th July
Fungicide	Ronilan 3rd August
Irrigation	29th June 28th July 10th August 18th August
First harvest of control	Nerina 22nd August, 67 days from drilling
Final harvest	31st August
Weather data	Temperature, rainfall and sunshine records are in Appendix II
Plant spacing	450mm row width Target population 30 plants/m^2

TABLE 2

OPTIMUM MATURITY AND TIME OF HARVEST INDICES FOR GREEN BEANS

	Total length of 10 seeds (mm)	
	Freezing Stage	Canning Stage
Long podded varieties for slicing or cutting (over 140mm long approximately)	100	120
Intermediate varieties for slicing or cutting (110-140mm long)	90	110
Short podded varieties for whole pack (100mm long approximately)	80	110

Samples for fresh market were judged by eye to be ready for harvest when the total length of ten seeds was slightly less than that required for freezing.

Seed length is estimated by measuring the length of the largest seed from each of the ten largest pods in rows of each plot.

TABLE 3

GREEN BEAN VARIETY TRIAL, SOURCES OF SEED, AND MATURITY AND YIELD AT FREEZING STAGE

Variety	Breeder	Yield tonnes/ha mean of three harvests at freezing stage	% Nerina	Maturity days ± Nerina
Nerina	RSL	2.88	100	0
Labrador	ASG	0.99	34	-2
Lasso	VRI	2.33	81	0
Masai	SEG	2.11	73	+6
Flexo (B314)	ASG	0.78	27	0
Boreal	ASG	1.33	46	0
XPB 344	ASG	1.67	58	+5
Matador	ASG	1.11	38	0
Paulista (RS1377)	RSL	1.10	38	-2
Sapporo (RS1508)	RSL	1.56	54	0
Corumba (RS1246)	RSL	1.33	46	+5
Tiber (CLX2830)	CLA	3.05	106	0
Morgane	CLA	1.67	58	-2
CLX 2305 QUEST	CLA	0.44	15	0
R6027	SEG	2.0	69	-2
R2328	SEG	1.22	42	0
R2634	SEG	1.44	50	0

TABLE 4

GREEN BEAN VARIETY TRIAL

POD CHARACTERISTICS AT FREEZING STAGE

Variety	Pod Type	Pod size (mm)		Seed Length	% Straight Pods	% Round Section
		Length	Width	(mm)		
Nerina	I	113	9.9	124	100	100
Labrador	I	125	10.0	115	100	100
Lasso	S	91	8.6	102	100	100
Masai	SF	93	6.7	95	100	100
Flexo	I	116	8.0	118	100	100
Boreal	S	96	7.8	102	100	100
XPB 344	SF	94	7.1	84	100	100
Matador	I	112	9.7	98	80	100
Paulista	I	111	8.5	70	100	100
Sapporo	I	124	7.6	100	100	100
Corumba	I	110	7.5	98	100	100
Tiber	FLAT	119	8.7	112	100	0
Morgane	L	129	9.4	148	100	100
CLX 2305	I	119	11.5	113	100	100
R6027	I	124	10.1	133	100	100
R2328	I	106	8.5	89	100	100
R2634	I	120	91	112	100	100

I = INTERMEDIATE

S = SHORT

F = FINE

L = LONG

SEED LENGTH = LENGTH IN MM OF 10 SEEDS FROM 10 MATURE PODS

TABLE 5

GREEN BEAN VARIETY TRIAL

PLANT CHARACTERISTICS AT FREEZING STAGE

Variety	Plant Height	Pods on Soil	Pod Colour	Harvest	
				Clusters	Broken
Nerina	3	5	4	4	5
Labrador	3	5	3	5	5
Lasso	2	3	3	4	5
Masai	1	3	3	5	5
Flexo	1	3	3	4	5
Boreal	1	2	3	5	5
XPB 344	3	4	3	5	5
Matador	3	4	4	4	5
Paulista	2	4	4	5	5
Sapporo	2	3	4	4	5
Corumba	1	2	3	4	5
Tiber	3	4	2	4	5
Morgane	3	2	4	3	4
CLX 2305	4	4	3	4	5
R6027	2	3	3	4	5
R2328	2	4	3	4	5
R2634	2	3	3	3	5

PLANT HEIGHT 1 = SHORT 5 = TALL

PODS ON SOIL 1 = MANY 5 = NONE

POD COLOUR 1 = LIGHT 5 = DARK

CLUSTERS 1 = MANY 5 = NONE

BROKEN 1 = MANY 5 = NONE

TABLE 6

FROZEN GREEN BEAN VARIETY TRIAL 1995 - SUMMARY OF SENSORY APPRAISAL SCORES

Variety	Depth	Yellow	Bright	Uniform	Soft/Firm	Stringy	Sweet	Strength
Nerina (c)	3.9	1.2	2.0	3.1	3.8	3.1	2.1	2.7
Labrador	3.9	0.8	2.1	3.3	2.7*	2.7	2.5	2.4
Lasso	3.2	1.8	2.7	2.8	2.8	2.4	2.3	2.7
Masai	2.9*	2.3	2.5	2.8	3.4	2.9	2.5	2.8
Flexo	3.0*	2.5	3.3**	2.4	3.3	3.9	2.1	2.6
Boreal	3.1*	1.8	2.8	3.0	3.3	2.8	2.2	2.7
XPB 344	3.1*	1.8	2.6	3.0	3.3	3.3	2.3	3.3
Matador	3.7	1.2	2.8	3.8	2.7*	2.2	2.5	3.3
Paulista	3.7	1.1	2.5	3.5	3.3	3.6	2.1	2.4
Sapporo	3.7	1.1	2.6	3.8	2.3*	2.3	2.4	3.3
Corumba	3.0	2.9**	3.1**	2.0**	3.3	3.1	2.0	2.3
Tiber	2.3***	3.0***	2.5	2.5	3.2	3.5	2.7	3.0
Morgane	2.8*	2.6	2.3	2.4	3.4	4.2*	2.1	2.4
R6027	3.9	0.6	2.1	3.8	3.0	2.3	3.2*	3.8**
R2328	3.3	1.3	2.4	3.5	3.3	2.9	2.3	2.8
R2634	2.9	2.1	2.1	2.3*	3.9	4.1	2.1	2.4
Overall Mean	3.3	1.7	2.5	3.0	3.2	3.1	2.3	2.8

	--- Range ---	Mean
Olive/Khaki/Brown	1.8 - 3.8	2.7
Grey	1.5 - 2.9	2.3

FRESH GREEN BEAN VARIETY TRIAL 1995 - SUMMARY OF SENSORY APPRAISAL SCORES

Variety	Depth	Yellow	Olive	Bright	Uniform	Stringy	Strength
Nerina (c)	3.8	0.7	3.2	1.7	3.4	2.4	3.1
Labrador	3.7	1.3	3.7	1.8	2.2*	2.6	3.0
Lasso	3.1	1.3	1.8*	3.1***	3.3	2.6	1.7**
Masai	2.7*	1.4	2.7	2.4	2.4	2.6	3.3
Morgane	3.8	0.9	3.7	1.7	2.9	5.0***	2.6
R6027	3.6	0.7	3.8	1.6	3.3	3.0	2.8
Boreal	2.9	2.2**	3.9	2.1	2.1**	2.7	2.8
XPB344	3.1	1.2	2.9	2.2	2.9	2.6	2.9
Matador	3.9	1.1	2.9	2.6	2.6	2.0	2.4
Paulista	3.8	0.9	3.0	2.3	3.4	2.8	2.4
Tiber	2.2**	2.4***	1.6***	2.9**	2.8	3.0	2.3
R2328	2.9	1.9**	2.9	2.3	2.7	2.3	3.0
Flexo	3.2	2.0**	3.6	2.7*	2.6	3.4	2.6
Sapporo	3.9	1.0	3.2	2.4	3.7	2.7	3.2
Corumba	3.7	1.3	3.4	2.3	2.8	2.9	3.3
R2634	3.2	1.9**	3.8	2.2	2.3	2.9	3.3
CLX2305	3.4	1.6	2.7	3.0**	3.1	2.7	2.8
Overall Mean	3.3	1.4	3.1	2.3	2.9	2.8	2.8

	--- Range ---	Mean
Grey	1.3 - 3.1	2.4
Soft/firm	2.3 - 3.6	3.0
Sweetness	1.8 - 2.8	2.4

Confidences of differences from Nerina
(Confidences are per Column of 17 varieties
based on Fisher's Modified LSD procedure)
* 95% ** 99% *** 99.9%

TABLE 7

SCORING SYSTEM FOR QUALITY APPRAISAL OF DWARF GREEN BEANS

	Attribute	SCORE				
		1	2	3	4	5
COLOUR	Depth of colour	Very pale	Slightly to moderate pale	Medium	Slightly to moderately dark	Very dark
	Amount of colour	Very slight	Slight	Moderate	Considerable	Very large
	Uniformity	Extremely non-uniform	Very non-uniform	Moderately non-uniform	Slightly non-uniform	Very uniform
	Brightness	Dull	Slightly dull	Moderately bright	Bright	Very bright
FLAVOUR	Strength of bean	Moderately weak	Fairly weak	Slightly weak	Slightly strong	Moderately strong
	Sweetness, bitterness	Not at all	Slightly	Moderately	Very	Extremely
TEXTURE	Soft/firm	Very soft	Moderately soft	Slightly soft	Slightly firm	Very firm
	Stringiness	Not at all	Slightly	Moderately	Very	Extremely

APPENDIX 1

Climate data

WELLESBOURNE	GR 4271E 2565N	47m AMSL

DAILY DATA FOR STATION : WELLESBOURNE : NAT GRID REF 4271E 2565N : ALTITUDE

	MAY 1995					JUNE 1995				
DAY:	TX	TN	TR	SS	E3:	TX	TN	TR	SS	E3:
1	17.8	3.4	0.0	4.2	10.1:	16.7	8.2	0.0	4.1	13.6:
2	21.9	6.5	0.0	9.6	10.9:	16.8	8.3	1.5	5.1	13.8:
3	24.5	5.4	0.0	11.9	11.5:	15.7	7.9	2.4	1.1	13.8:
4	24.9	5.9	0.0	12.5	12.1:	15.2	9.2	0.0	3.4	13.8:
5	26.0	6.2	0.0	12.1	12.7:	17.4	8.6	0.1	4.8	13.6:
6	26.0	8.0	0.0	11.8	13.4:	17.2	10.5	0.7	0.5	14.1:
7	25.8	9.0	0.0	9.8	13.9:	17.5	12.7	0.0	9.1	14.4:
8	16.0	8.7	0.0	7.0	13.9:	15.2	5.7	0.0	8.3	14.0:
9	14.3	5.2	0.0	4.2	13.0:	18.0	6.6	0.0	5.2	13.6:
10	14.6	2.4	0.0	7.0	12.1:	13.7	7.6	0.8	1.1	13.7:
11	9.5	4.9	0.0	0.0	12.1:	13.5	10.5	0.5	0.4	13.6:
12	10.6	2.6	0.2	3.5	11.2:	13.3	8.5	0.0	1.1	13.1:
13	12.0	1.1	0.0	11.1	10.6:	14.1	5.4	0.0	0.1	12.8:
14	13.6	-0.6	0.0	9.2	10.3:	16.5	8.5	0.0	1.8	12.8:
15	15.8	-0.4	0.0	3.0	10.1:	18.3	6.9	0.0	5.8	12.8:
16	11.9	5.0	11.4	0.2	10.9:	20.1	8.8	1.3	3.0	13.2:
17	9.1	7.1	8.0	0.1	10.7:	18.1	10.3	0.0	1.9	13.8:
18	13.3	4.7	0.6	11.2	10.1:	21.5	9.7	0.0	13.3	13.9:
19	15.6	5.8	0.0	8.5	10.8:	23.4	10.8	0.0	5.7	14.8:
20	13.5	6.4	0.0	0.4	11.3:	23.7	12.2	0.0	9.7	15.7:
21	16.5	7.9	0.0	0.3	11.6:	20.7	13.0	0.0	13.4	16.4:
22	18.4	8.1	0.0	4.7	12.0:	23.5	6.9	0.0	13.2	16.0:
23	21.4	8.2	0.0	8.1	12.6:	22.4	6.9	0.0	15.1	16.3:
24	20.3	6.9	0.5	4.6	13.3:	18.2	10.4	0.0	0.2	16.3:
25	19.4	8.1	0.0	12.9	13.2:	19.1	11.6	0.0	6.4	15.5:
26	20.3	9.7	2.3	6.3	13.4:	25.2	10.7	0.0	8.5	15.7:
27	20.0	11.5	6.3	4.6	13.6:	26.3	10.8	0.0	12.8	16.4:
28	19.7	12.9	0.3	8.3	14.0:	28.6	12.3	0.0	11.4	17.1:
29	17.9	9.4	1.0	7.5	13.8:	28.6	11.9	0.0	16.5	17.8:
30	15.4	9.8	5.7	0.8	13.8:	31.6	9.2	0.0	14.5	17.9:
31	17.8	6.3	0.0	7.0	13.1:					

ISSUED BY : THE COMMERCIAL SERVICES, METEOROLOGICAL OFFICE, BRACKNELL

DAILY OUTPUT PARAMETERS ARE :

EL	CODE	DESCRIPTION	UNITS
3	TX	MAX DRY BULB TEMP	DEG C
4	TN	MIN DRY BULB TEMP	DEG C
9	TR	24 HOUR RAINFALL	MM
13	SS	SUNSHINE AMOUNT	HRS
27	E3	EARTH TEMP 30CM	DEG C

Daily climatological

WELLESBOURNE : GR 4271E 2565N : 47m AMSL

Items selected as follows:

MAXTEMP : 24 hour maximum temperature (deg C) (24hrs from 09GMT)
MINTEMP : 24 hour minimum temperature (deg C) (24hrs to 09GMT)
RAIN : 24 hour rainfall (mm) (24hrs from 09GMT)
SUN : Sunshine amount (hours) (24hrs from 00GMT)
30SOIL : 30cm soil temperature (deg C) (Read at 09GMT)

	MAXTEMP	MINTEMP	RAIN	SUN	30SOIL
Sat 01Jul95	19.9	9.2	nil	3.5	18.8
Sun 02Jul95	21.0	8.2	nil	5.2	17.7
Mon 03Jul95	18.6	9.0	nil	2.9	17.5
Tue 04Jul95	18.7	7.5	nil	4.7	17.3
Wed 05Jul95	25.3	8.9	nil	5.5	17.0
Thu 06Jul95	23.0	10.5	nil	5.1	17.6
Fri 07Jul95	25.6	14.9	nil	8.3	17.7
Sat 08Jul95	26.0	13.4	nil	8.8	18.5
Sun 09Jul95	26.6	11.4	nil	12.9	18.5
Mon 10Jul95	30.7	14.3	1.3	4.8	18.8
Tue 11Jul95	26.1	16.3	1.0	1.4	19.6
Wed 12Jul95	26.3	14.3	trace	9.8	19.3
Thu 13Jul95	24.5	11.7	trace	3.5	19.0
Fri 14Jul95	22.9	14.6	5.3	9.0	19.1
Sat 15Jul95	21.6	13.5	0.1	4.4	18.3
Sun 16Jul95	23.0	13.0	1.3	7.3	18.3
Mon 17Jul95	21.1	14.3	0.3	1.3	18.3
Tue 18Jul95	23.8	15.3	trace	0.5	18.2
Wed 19Jul95	26.3	17.3	trace	2.1	18.6
Thu 20Jul95	29.0	15.4	nil	11.3	19.2
Fri 21Jul95	24.0	15.4	nil	5.7	19.8
Sat 22Jul95	22.1	8.2	nil	13.8	18.4
Sun 23Jul95	22.7	6.8	nil	10.8	18.2
Mon 24Jul95	27.7	9.3	nil	14.8	18.4
Tue 25Jul95	29.7	11.7	nil	15.0	19.7
Wed 26Jul95	25.2	14.7	0.5	8.5	20.0
Thu 27Jul95	25.7	13.3	trace	8.0	19.5
Fri 28Jul95	26.6	16.4	trace	2.1	19.6
Sat 29Jul95	30.4	12.9	nil	13.2	20.3
Sun 30Jul95	31.4	10.5	nil	12.2	20.6
Mon 31Jul95	32.0	15.4	trace	12.0	21.5

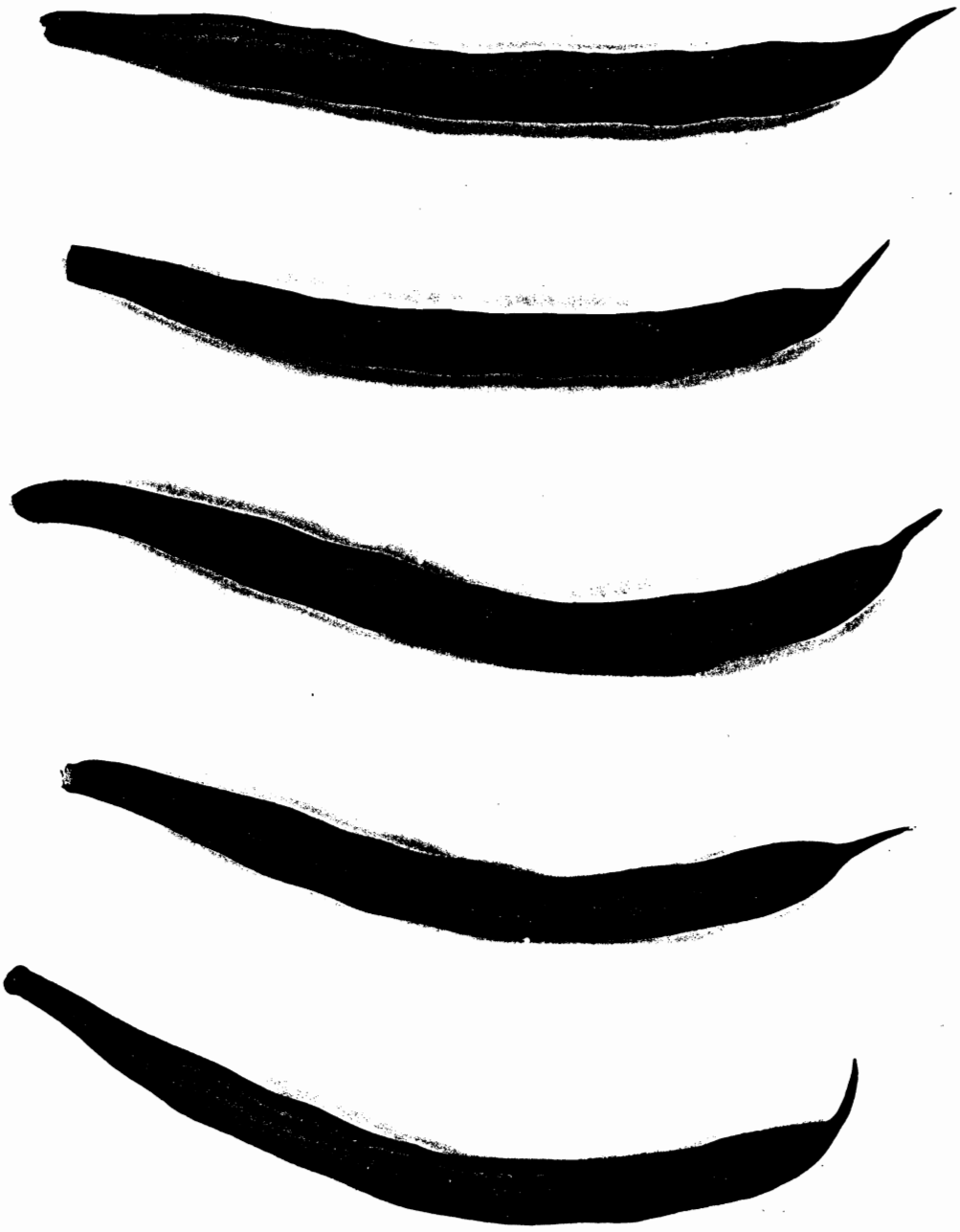
: WELLESBOURNE : GR 4271E 2565N : 47M AMSL :

DAY	AUGUST 1995 MAX TEMP (09-09) (DEG C)	AUGUST 1995 MIN TEMP (09-09) (DEG C)	AUGUST 1995 RAINFALL (09-09) (MM)	AUGUST 1995 SUNSHINE (00-24) (HOURS)	SEPTEMBER 1995 MAX TEMP (09-09) (DEG C)	SEPTEMBER 1995 MIN TEMP (09-09) (DEG C)	SEPTEMBER 1995 RAINFALL (09-09) (MM)	SEPTEMBER 1995 SUNSHINE (00-24) (HOURS)
01	32.8	15.4	0.1	9.1	20.5	13.6	2.3	0.8
02	33.0>	17.9>	NIL	10.8	18.4	13.4	0.2	3.1
03	31.7	14.5	NIL	13.0	19.0	6.3	0.5	8.8
04	26.2	15.1	NIL	13.1	19.3	6.0	7.4	4.3
05	26.9	9.5	NIL	13.6	16.6	9.8	4.4	4.8
06	24.8	10.6	NIL	11.0	19.7	12.0	11.3	1.3
07	22.1	15.1	NIL	3.5	18.3	12.9	22.4>	0.3
08	21.5	9.0	NIL	7.8	18.1	14.3>	0.1	0.2
09	25.4	5.2<	NIL	11.6	21.1>	11.4	TRACE	9.2
10	29.4	10.6	NIL	13.3	18.4	7.5	18.8	1.6
11	31.8	12.3	NIL	12.7	19.7	12.2	0.1	5.1
12	28.7	14.3	TRACE	9.1	17.7	10.3	3.3	6.1
13	22.9	14.6	NIL	5.0	18.3	9.5	TRACE	5.4
14	24.4	14.2	NIL	10.2	18.0	6.6	6.5	1.3
15	29.4	11.3	NIL	12.2	15.1	12.3	3.5	NIL
16	29.1	12.9	NIL	12.3	16.4	11.2	0.7	0.9
17	29.7	12.8	NIL	13.1	17.2	12.1	5.6	1.2
18	28.7	15.6	NIL	8.8	20.8	12.6	1.2	6.4
19	29.6	13.5	NIL	8.8	19.3	14.2	NIL	4.7
20	29.1	13.2	NIL	11.2	16.9	10.1	NIL	1.9
21	30.4	12.0	NIL	12.5	19.9	5.8	TRACE	9.2
22	31.1	12.1	NIL	13.8>	18.8	9.2	TRACE	2.6
23	22.9	17.1	0.9	4.5	18.8	7.7	6.0	8.8
24	22.9	9.1	TRACE	1.7	15.1	11.2	0.4	4.6
25	23.8	16.7	TRACE	7.9	16.9	4.8	1.0	2.3
26	23.9	13.6	0.4	5.1	16.6	11.0	5.1	NIL
27	19.2	12.9	NIL	5.7	14.2	10.4	0.1	7.3
28	19.3	10.3	TRACE	11.8	14.1<	4.1	TRACE	8.2
29	17.9<	11.5	1.7>	NIL	16.5	4.7	TRACE	9.3>
30	20.9	7.6	NIL	5.4	16.2	3.3<	1.1	1.3
31	21.1	11.2	NIL	1.0				
	=====	=====	=====	=====	=====	=====	=====	=====
MONTH TOTAL			3.1	279.6			102.0	121.0
MONTH MEAN	26.1	12.6			17.9	9.7		
1961-90 AVERAGE	21.1	10.9	60.0	172.8	18.4	9.1	52.0	136.3
COMPARISON WITH AVERAGE	+5.0	+1.7	5.2%	161.8%	-0.5	+0.6	196.2%	88.8%

KEY: > =MAXIMUM VALUE FOR MONTH. < =MINIMUM VALUE FOR MONTH.

APPENDIX 2

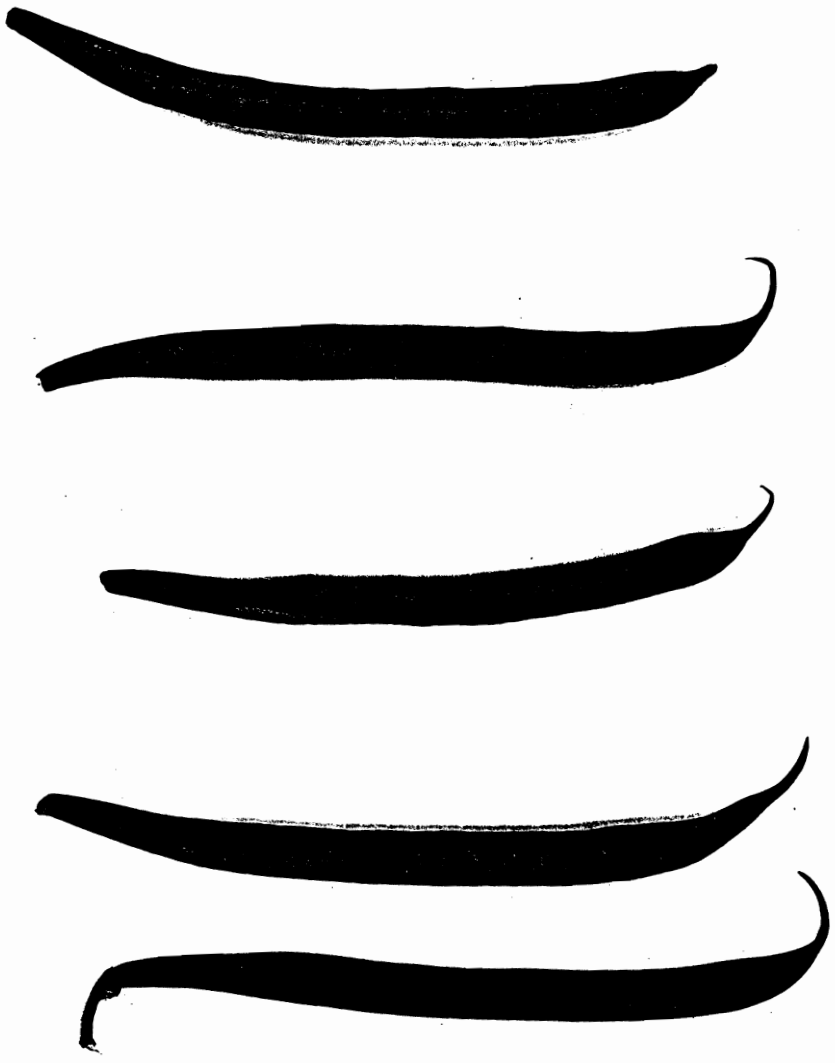
Photocopy pictures of bean pods



A NERINA

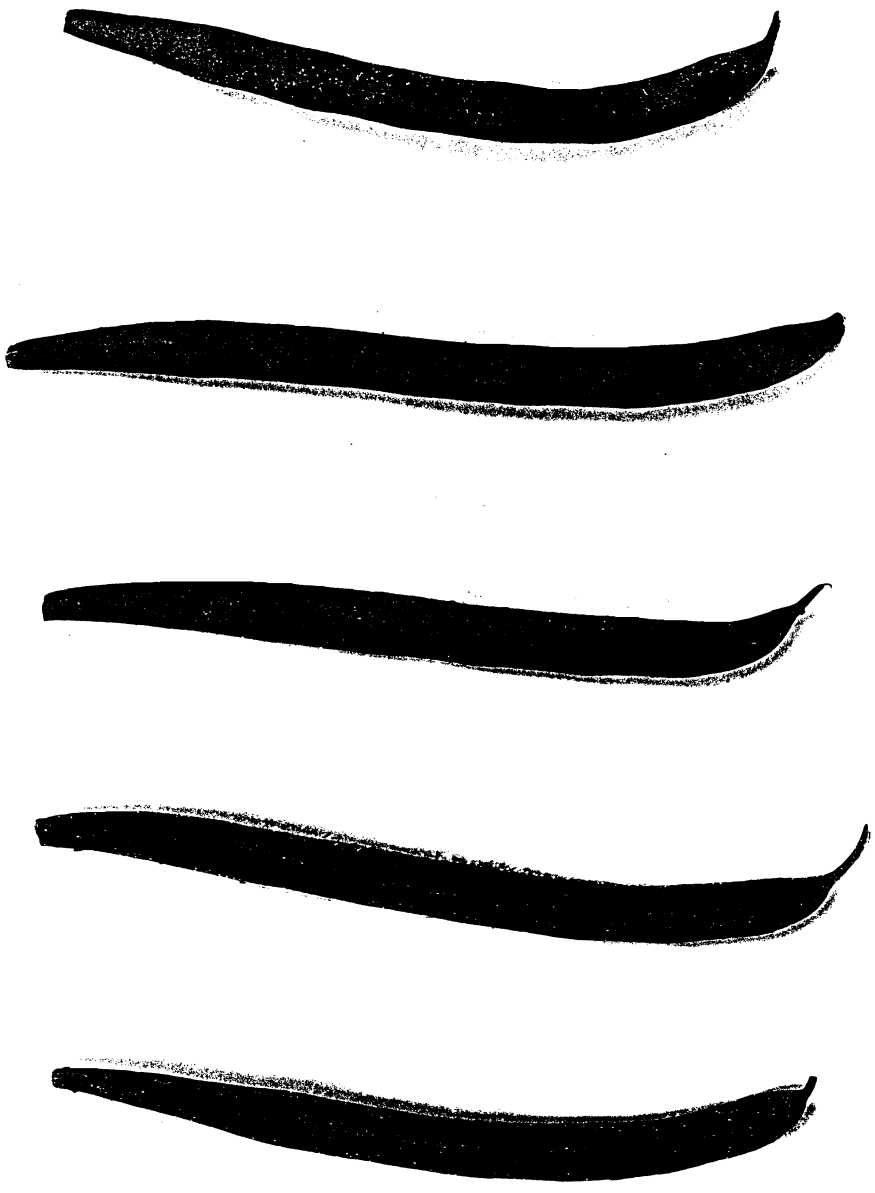
B LABRADOR

C LASSO

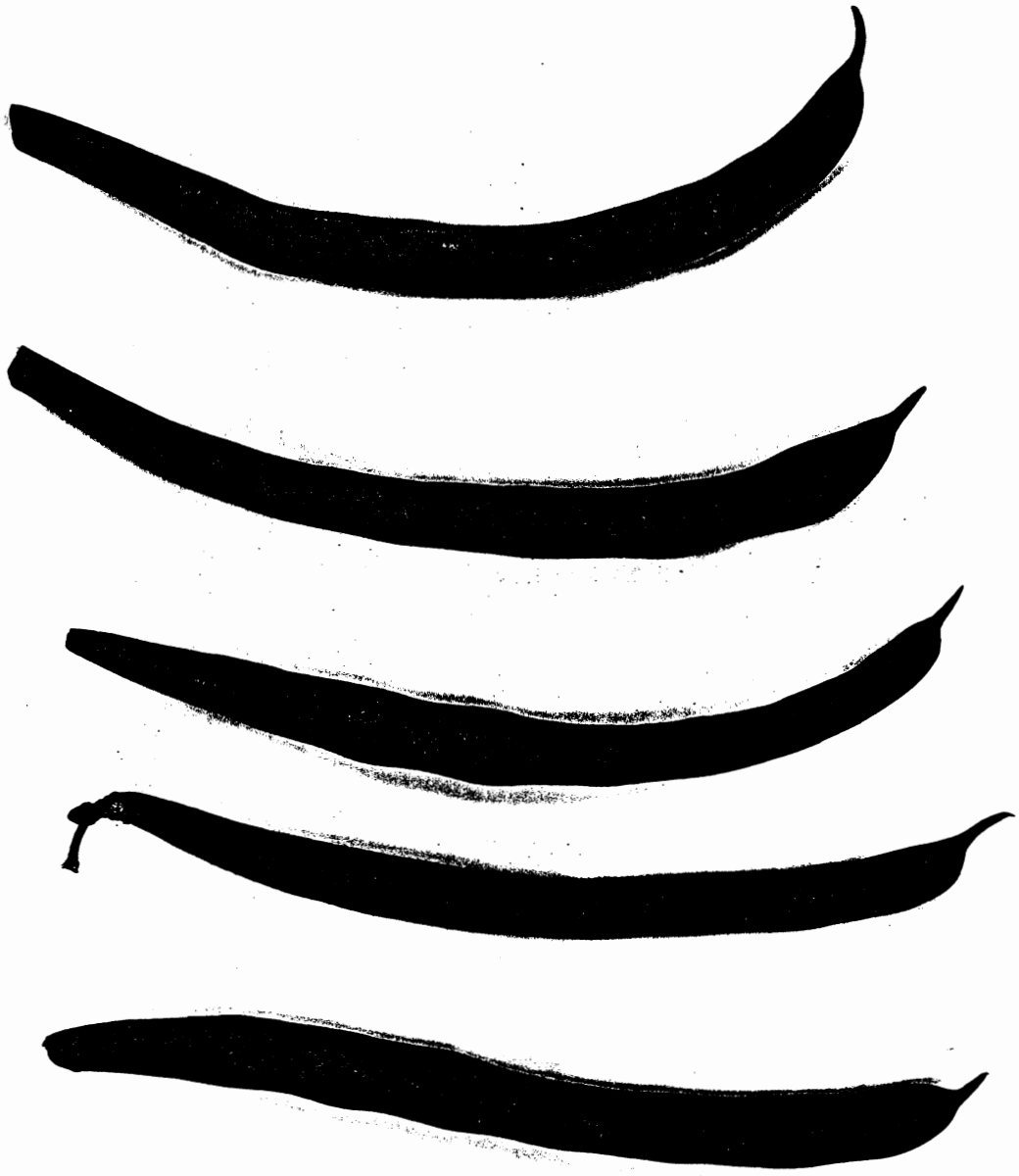


D MASAI

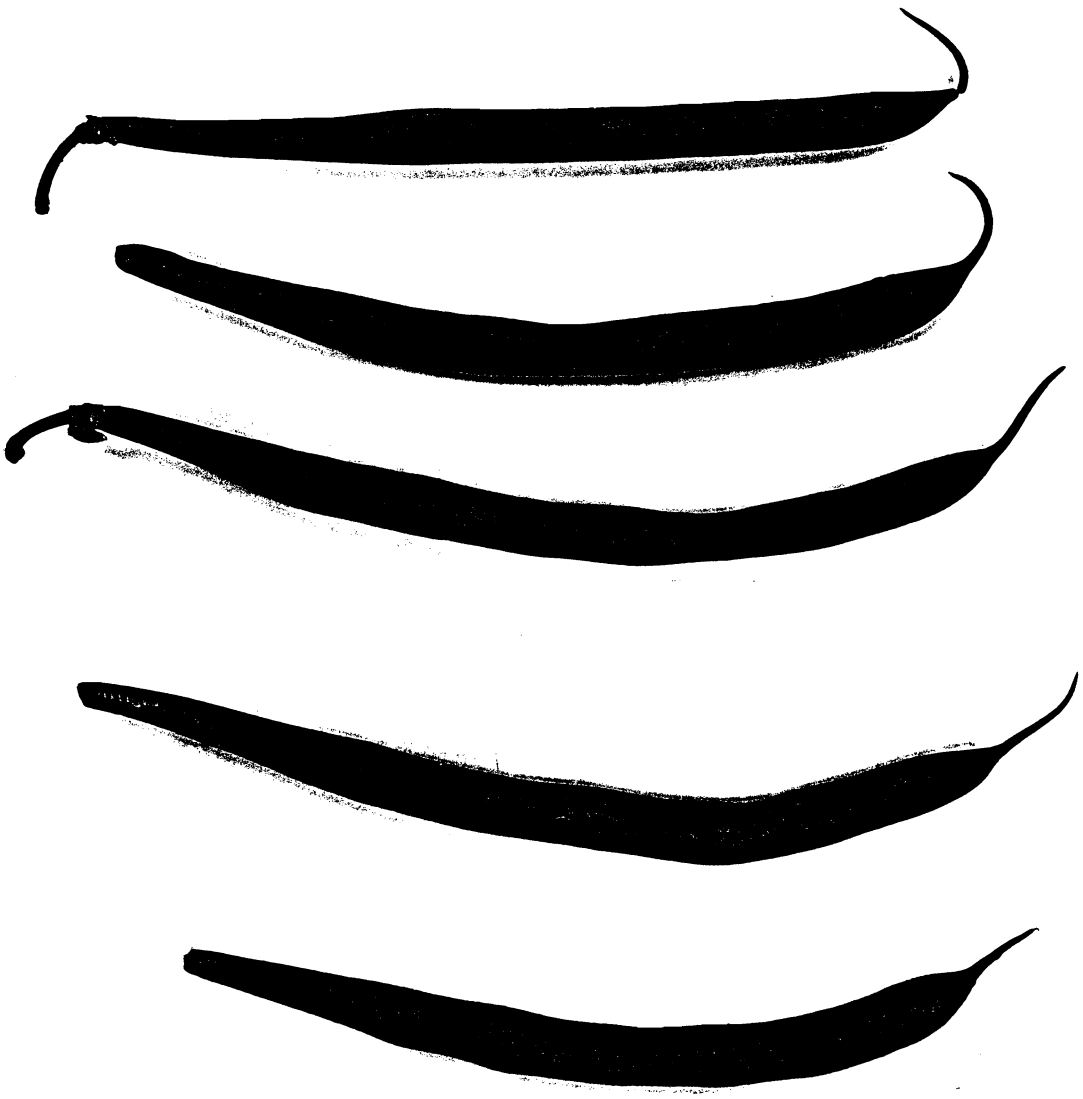
H BOREAL



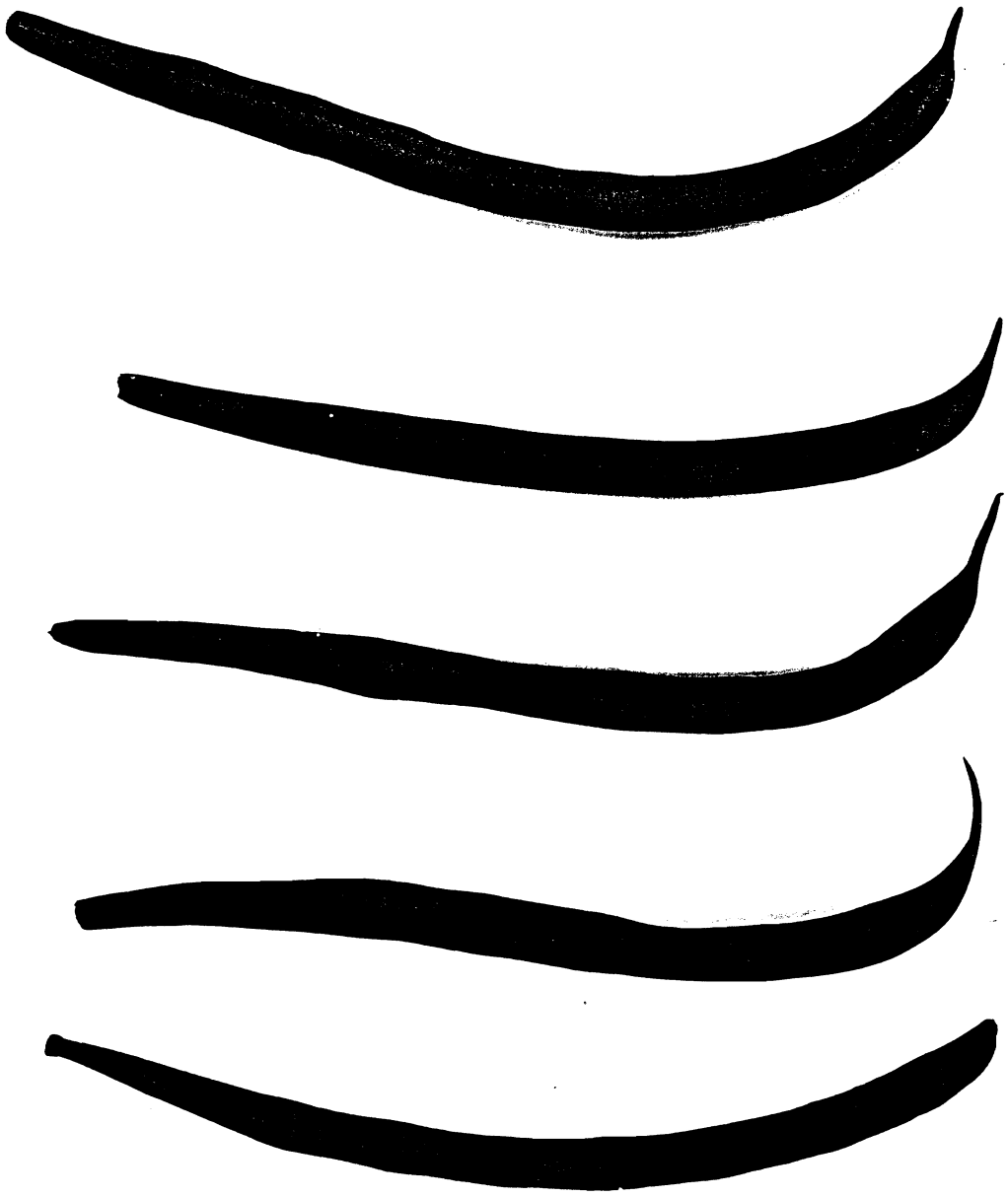
J XPB 344



K MATADOR

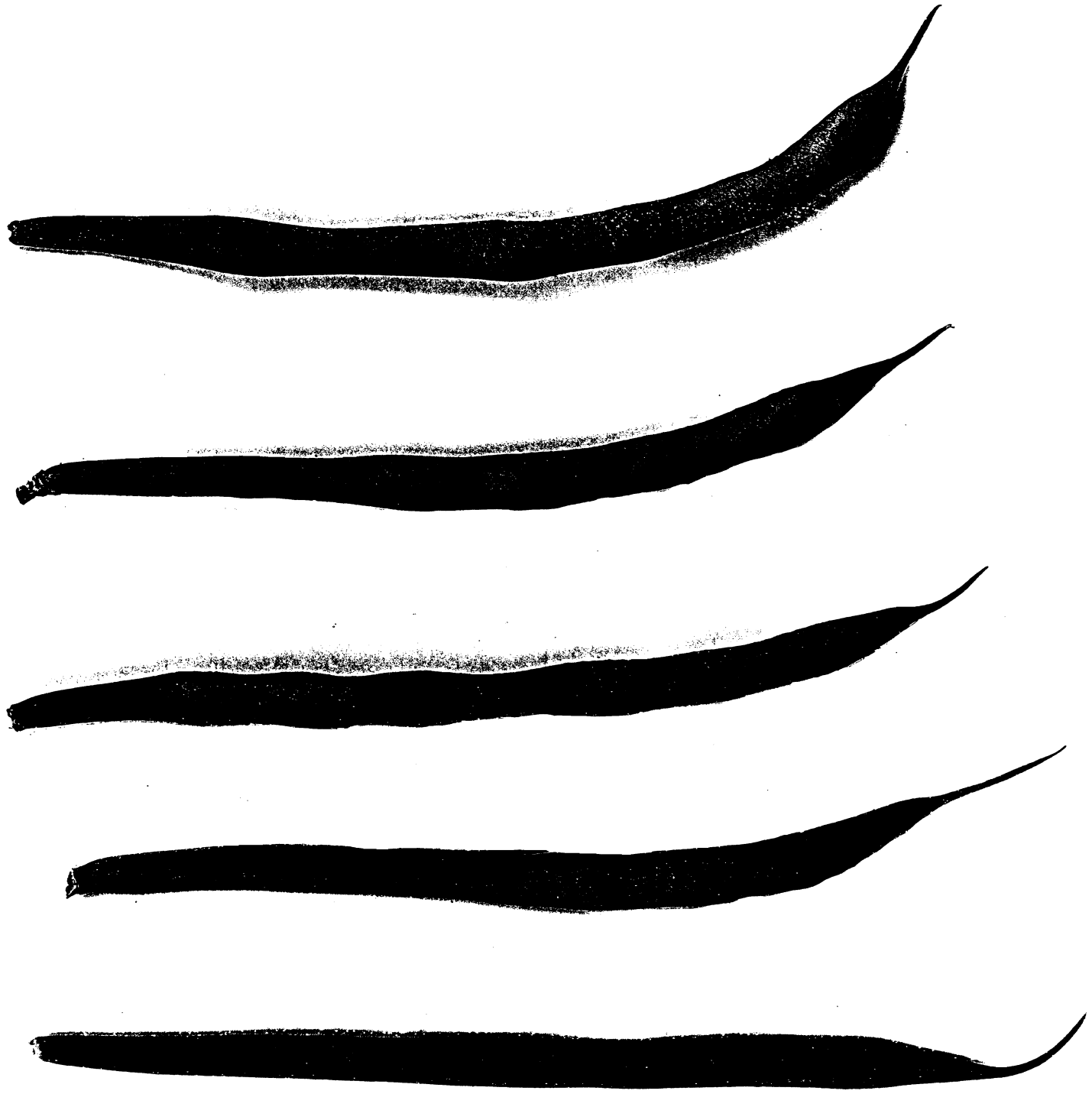


L PAULISTA



M SAPPORO

P TIBER



S MORGANE

T CLX 2305

W R6027

X R2328

Z R2634