

1981

Thirumunthi, S.; Rajendran, B.; Krishnan, D.

Insectivorous Birds Associated with the
Rice Ecosystem in Madurai.

- JBNHS 78 (3) 603-605 pp.

College farms, Chittamkulam tank, Othakali
uthangudi, Ulaganeri & water sheds of Madu-
melur road up to Chittampatti.

Horse Swift, Palm Swift, Grey Drongo?
Common Indian Nightjar*, Black bittern?
Common babbler T. caudatus? Parula flycatcher - rare?

* rare?

R. J. RANJIT DANIELS
TAMILNADU

DEPT. OF AGRICULTURAL ENTOMOLOGY
AGRICULTURAL UNIVERSITY

Luban tree pie - sau? S. rufa ??

1981. Thirumathi S., Krishnadas S.,

A note on feeding habits of Swifts (Apodidae
Apodiformes) JBNHS 78 (2) 378-379 pp.

Apus affinis - M. persicae Chittis in
Othenchattam +
Cypselurus parvus (Palm Swift) - Leptocoma
acuta on Rice in Madurai.

field

Printed by Damilo Press (ag)

Coimbatore - 3.

Book 0.

MASU

TECHNICAL DIARY

**Nature
Study.**
1980

Dear Members,

The "MASU - Diary 1980" is brought forward based on the request of the students of Tamil Nadu Agricultural University. Attempt has been made to incorporate important facts and figures on all aspects of agricultural sciences viz., Agronomy, Agricultural Economics, Animal Husbandry, Forage Crops, Entomology, Horticulture, Plant Pathology, Soil Science and Agricultural Chemistry, Agricultural Engineering, etc. For want of time and space only important aspects have been covered.

This is a maiden attempt in the history of MASU. I request the members of pass on their comments on this to me, so that such a diary can be prepared in a more productive manner in the coming years. I solicit your kind cooperation for the successful running of MASU and improving its activities.

K. K. Mathan
(Secretary)
MASU.

ABOUT MASU AND MAJ

!

Sixty nine years ago, the then staff of the Agricultural College and Research Institute, Coimbatore as well as those working in the extension wing felt that the students of this College, members of the Agricultural department and others interested in the development and improvement of agriculture should get together "to exchange their views and experience in the form of papers, debates and discussions". This resulted in the establishment of the Madras Agricultural Students Union in 1911 and has grown with the Agricultural College and Research Institute at Coimbatore and now the Tamil Nadu Agricultural University.

By the words "Students" in the name of the Organisation, it is meant the "Students" of Agriculture in the broad sense that they are interested in learning and continuing to learn all about scientific agriculture.

One of the things which the Union has done was to have started from its very inception (1911) the publication of the Madras Agricultural Journal as a year book. From next year it was a quarterly till 1915 when it was converted into a monthly. However the yearly publications were numbered serially from 1913 onwards. The Journal has usefully served the cause of Scientific Agriculture in respect of research, education and extension for nearly seven decades. It is now recognised all over the world as an important Agricultural publication and is in the exchange list of several Agricultural Journals-Indian and Foreign.

PERSONAL MEMORANDA

Name Russell Joseph Ravjit Davich

Address Lyonsville
Henry street
Wagon Coal - 1

Telephone No.

Vehicle No. Reg. No.

Driving Licence No. Renew before

Radio Licence No. Renew before :
31st January

Insurance Policy No. Due on

Bank Account No.

Safe Deposit Vault No.

Emergency Address

Date of Birth 5.6.59 Blood Group

Height cms. Weight Kgs.

NOTABLE DATES

College Reopening Date : _____

<u>Trimester</u>	<u>Beginning Date</u>	<u>Closing Date</u>
First	_____	_____
Second	_____	_____
Third	_____	_____

COURSES REGISTERED

<u>Ist Trimester</u>	<u>IIInd Trimester</u>	<u>IIIrd Trimester</u>
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____
5. _____	_____	_____
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____
9. _____	_____	_____

PONGAL RELEASE OF CROP VARIETIES-1980

(Tamil Nadu Agricultural University)

S, No.	Crop	Variety	Parentage	Duration (Days)	Yield Rainfed	Yield (Kg/ha Irrigated)
1.	Sorghum	CO 24	CK 24 x SPR 1341	100-105	2840	5050
2.	Cumbu	X 4	MS 5141 A x PT 1921	85-90	960	2530
3.	Varagu	CO 3	Inbred from Georgian Variety	120	—	2640
4.	Soybean	CO 1	Selection from Thailand Variety	85	1090	2260
5.	Mochai	CO 1	Pureline selection from local variety of Coimbatore (DL 2539)	140	—	1600
6.	Lucerne	CO 1	Mass selection from Coimbatore local	Perennial	6-8 cuttings	—
7.	Sweet Potato	CO 2	Clonal selection from 1837	110-115	—	32t/ha
8.	Mullai	CO 1	Secondary selection from local variety	Perennial (Fl.after 60days)	—	8,800
9.	Pichi (Jathimalli)	CO 1	Secondary selection from Lucknow Jathimalli	Perennial Climber (Fl.after 150days)	—	10,100
10.	Paddy	MDU 1	IR8 x chitraikar	115-120	1800	—

CALENDAR 1980

	January	February	March	April
Sun	6 13 20 27	3 10 17 24	30 2 9 16 23	6 13 20 27
Mon	7 14 21 28	4 11 18 25	31 3 10 17 24	7 14 21 28
Tue	1 8 15 22 29	5 12 19 26	4 11 18 25	1 8 15 22 29
Wed	2 9 16 23 30	6 13 20 27	5 12 19 26	2 9 16 23 30
Thu	3 10 17 24 31	7 14 21 28	6 13 20 27	3 10 17 24
Fri	4 11 18 25	1 8 15 22 29	7 14 21 28	4 11 18 25
Sat	5 12 19 26	2 9 16 23	1 8 15 22 29	5 12 19 26
	May	June	July	August
Sun	4 11 18 25	29 1 8 15 22	6 13 20 27	31 3 10 17 24
Mon	5 12 19 26	30 2 9 16 23	7 14 21 28	4 11 18 25
Tue	6 13 20 27	3 10 17 24	1 8 15 22 29	5 12 19 26
Wed	7 14 21 28	4 11 18 25	2 9 16 23 30	6 13 20 27
Thu	1 8 15 22 29	5 12 19 26	3 10 17 24 31	7 14 21 28
Fri	2 9 16 23 30	6 13 20 27	4 11 18 25	1 8 15 22 29
Sat	3 10 17 24 31	7 14 21 28	5 12 19 26	2 9 16 23 30
	September	October	November	December
Sun	7 14 21 28	5 12 19 26	30 2 9 16 23	7 14 21 28
Mon	1 8 15 22 29	6 13 20 27	3 10 17 24	1 8 15 22 29
Tue	2 9 16 23 30	7 14 21 28	4 11 18 25	2 9 16 23 30
Wed	3 10 17 24	1 8 15 22 29	5 12 19 26	3 10 17 24 31
Thu	4 11 18 25	2 9 16 23 30	6 13 20 27	4 11 18 25
Fri	5 12 19 26	3 10 17 24 31	7 14 21 28	5 12 19 26
Sat	6 13 20 27	4 11 18 25	1 8 15 22 29	6 13 20 27

CALENDAR 1981

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Tue	6 13 20 27	3 10 17 24	3 10 17 24 31	7 14 21 28
Wed	7 14 21 28	4 11 18 25	4 11 18 25	1 8 15 22 29
Thu	1 8 15 22 29	5 12 19 26	5 12 19 26	2 9 16 23 30
Fri	2 9 16 23 30	6 13 20 27	6 13 20 27	3 10 17 24
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Thu	3 10 17 24	1 8 15 22 29	5 12 19 26	3 10 17 24 31
Fri	4 11 18 25	2 9 16 23 30	6 13 20 27	4 11 18 25
Sat	5 12 19 26	3 10 17 24 31	7 14 21 28	5 12 19 26

**PUBLIC AND GOVERNMENT HOLIDAYS DURING THE
YEAR 1980**

Tuesday the 1st January, 1980	: New Year's day
Tuesday the 15th January, 1980	: Pongal
Wednesday the 16th January, 1980	: Thiruvalluvar's day
Thursday the 17th January, 1980	: Uzhavar Thirunal
Saturday the 26th January, 1980	: Republic day
Thursday the 31st January, 1980	: Meelad-un Nabi
Monday the 17th March, 1980	: Telugu New Year's day
Friday the 4th April, 1980	: Good Friday
Sunday the 13th April 1980	: Tamil New Year's day
Thursday the 1st May, 1980	: May day
Monday the 30th June, 1980	: Half Yearly closing of bank Accounts
Wednesday the 30th August, 1980	: Ramzan
Friday the 15th August, 1980	: Independence Day
Saturday the 13th September, 1980	: Vinayakar Chaturthi
Thursday the 2nd October, 1980	: Gandhi Jayanthi
Saturday the 18th October, 1980	: Ayudha Pooja
Sunday the 19th October, 1980	: Ayudha Pooja
Tuesday the 21st October, 1980	: Bakrid
Thursday the 6th November, 1980	: Deepavali
Wednesday the 19th November, 1980	: Muharram
Thursday the 25th December, 1980	: Christmas
Wednesday the 31st December, 1980	: Annual Closing of Bank Accounts

WEIGHTS AND MEASURES

ENGLISH-METRIC EQUIVALENTS

Length

Inch	:	25.4 millimetres
Foot	:	30.48 centimetres
Yard	:	0.9144 metre
Chain	:	20.611 metres
Mile	:	1.609 kilometres
Centimetre	:	0.393 inch
Metre : 1 093 yards	:	0.049 chain
Kilometre : 0.621 mile	:	4.97 furlong
0.539 nautical mile	:	1.093.6 yards

Areas

Square inch (in ²)	:	6.45 cm ²
Square yard (yd ²)	:	0.8361 m ²
Acre	:	0.404 hectare
Square mile (mile ²)	:	2.589 km ²
Square cm (cm ²)	:	0.155 in ²
Centiare (1cm ²)	:	1.96 yd ²
Hectare (10,000 m ²)	:	2.471 acres
Square km (km ²)	:	0.386 mile ²

Volume

Cubic in (in ³)	:	16 38 cm ³
Cubic ft (ft ³)	:	28.316 dm ³
Cubic yd (yd ³)	:	0.704 m ³
Fl. oz.	:	28.41 cm ³
Imp. gall.	:	4.546 litres
Imp. bushel	:	0.364 hectolitre
Cubic. cm. (cm ³)	:	0.061 in ³
Cubic. dm. (dm ³)	:	0.035 ft ³
Cubic m. (m ³)	:	1.308 yds ³
	:	27.496 bushels
	:	1.759 = 0.220 imp. gall

WEIGHTS AND MEASURES**Weight.**

Oz. (av.)	:	28.349 g
Lb. (av.)	:	0 4536 kg
Cwt.	:	50.8 kg = 0.508 qui
ton	:	1.016 kg = 1.016 m. tons
Gramme	:	0.032 oz (av)
Kilogramme	:	2.205 lb (av)
M. Tonne	:	19.684 cwts:2,200 lb
Quintal	:	1.968 cwts

GUNTER'S CHAIN MEASURE

7.92 inches	:	1 link
25.00 links	:	1 pole
4.00 poles	:	1 chain
80.00 chains	:	1 mile
62.7264 square inches	:	1 sq. link
625 00 sq. links	:	1 sq pole
16.00 sq. poles	:	1 sq. chain
10.00 sq. chains	:	1 acre
1.00 sq. chain	:	10,000 sq. links
1.00 sq. link	:	62.75 sq. inches

Days	Rahukalam		Gulikankalam		Yamagandam	
	From	To	From	To	From	To
Sun	4-30	6-0 PM	3-0	4-30 PM	12	1-30 PM
Mon	7-30	9-0 AM	1-30	3-0 PM	10-30	12 PM
Tues	3-00	4-30 PM	12	1-30 PM	9	10-30 AM
Wed	12-0	1-30 PM	10-30	12 AM	7-30	9-0 AM
Thur	1-30	3-00 PM	9	10-30 AM	6-0	7-30 AM
Fri	10-30	12 AM	7-30	9-0 AM	3-0	4-30 PM
Sat	9-0	10-30 AM	6-0	7-30 AM	1-30	3-30 AM

DOUBLE CONVERSION TABLE FOR WEIGHTS AND MEASURES

Notes :- The Central figures represent either of the two columns beside them, as the case may be Example
1 Kilometre = 0.621 Mile and 1 Mile = 1.609 Kilo
metres.

<u>Kilometres</u>		<u>Miles</u>	<u>Centimetres</u>		<u>Inches</u>
1.609	1	0.621	2,540	1	30.94
3.219	2	1.243	5,080	2	0.787
4.828	3	1.864	7,620	3	1.181
6.437	4	2.485	10,160	4	1.575
8.047	5	3.107	12,700	5	1.969
9.656	6	3.728	15,240	6	2.362
11.266	7	4.350	17,780	7	2.756
12.875	8	4.971	20,320	8	3.150
14.484	9	5.592	2,860	9	3.543
16.094	10	6.214	25,400	10	3.937
32.187	20	12.427	70,800	20	7.874
48.281	30	18.641	65,200	30	11.811
64.375	40	24.855	101,600	40	15.748
80.468	50	31.068	127,000	50	19.685
96.562	60	37.282	152,400	60	23.622
112.655	70	43.495	177,800	70	27.559
128.750	80	49.709	203,200	80	31.496
144.843	90	55.923	228,600	09	35.433
160.936	100	62.136	254,000	100	39.370

DOUBLE CONVERSION FOR WEIGHTS AND MEASURES

<u>Kilograms</u>		<u>Av. Pounds</u>	<u>Litres</u>		<u>Gallons</u>
0.454	1	2.205	4.546	1	0.220
0.907	2	4.409	9.092	2	0.440
1.361	3	6.614	13.638	3	0.660
1.814	4	8.818	18.184	4	0.880
2.268	5	11.023	22.730	5	1.100
2.722	6	13.228	27.276	6	1.320
3.175	7	15.432	31.822	7	1.540
3.629	8	17.637	36.368	8	1.760
4.082	9	19.842	40.914	9	1.980
4.536	10	22.046	45.460	10	2.200
9.072	20	44.092	90.919	20	4.399
13.608	30	66.139	136.379	30	6.599
18.144	40	88.185	181.840	40	8.799
22.680	50	110.231	227.298	50	10.999
27.215	60	132.277	272.758	60	13.198
31.751	70	154.323	318.217	70	15.398
36.287	80	176.370	363.677	80	17.598
40.823	90	198.416	409.136	90	19.797
45.359	100	220.462	454.596	100	21.997

AGRONOMY

Crop & Varieties (1)	Duration (days) (2)	Season & sowing time (3)	Seed rate (kg/ha) (4)	Spacing(cm) (5)	N	P ₂ O ₅	K ₂ O	Grain yield (kg/ha) (7)
Rice								
CO 40	165-175	August	30	20x15	120	: 60	: 60	6100
CO 41	100-105	1. May-June 2. Dec-January	60	20x10	100	: 50	: 50	5000
CO 42	135	June-July	40	20x20	120	: 60	: 60	5000
ADT 33	110	1. April-May	60	20x10	100	: 50	: 50	5600
ADT 34	110	2. Dec-January	60	20x10	100	: 50	: 50	5900
ADT 35	130-135	1. May-June 2. August 3. Dec-January	40	20x10	120	: 60	: 60	4650
TK M9.	100-105	1. May-July	60	20x10	100	: 50	: 50	5000
IR 20	130	All season	40	20x20	120	: 60	: 60	5000
IR 34	130-135	1. June-July 2. August 3. Sept-Oct.	40	20x20	120	: 60	: 60	4850
IET 4786	100-105	1. April-July 2. Dec-January	60	20x10	100	: 50	: 50	5000
NLR 9672	160-170	August	30	20x15	120	: 60	: 60	4500

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						Grain yield kg/ha	
						Irrigated	Rainfed
Sorghum							
CO 18	95-100	1. Jan-Feb. 2. Ap-May	10	45 x 45	70 : 50 : 25	3000	-
CO 21	100-105	1. Jan-Feb 2. June-July	10	45 x 45	"	4250	2000
CO 22	85-90	1. Jan-Feb. 2. Ap-May 3. June-July	10	45 x 45	"	4500	2500
CO 23	95-100	All season	"	"	"	5000	2750
CSH 5	100-105	1. Jan-Feb. 2. June-July	"	"	"	4500	4000
K. Tall	90	All season	"	"	"	4300	3750
K 5	90-95	1. Jan-Feb 2. June-Jul 3. Sept-Oct	"	"	"	3500	2750
Maize							
K1	80-85	1. June-July	30	60 x 20	100 : 37.5 : 62.5	3000	2000
Gang-5	95	2. Jan-Feb 3. Sept-Oct	25	60 x 20	100 : 37.5 : 62.5	4000	3000
Cumbu							
KM1	75	1. March-April	3.75	45 x 45	100 : 12.5 : 12.5	2500	1600
KM2	80	2. June-July		45 x 15	100 : 12.5 : 12.5	3000	2250
CO6	90	3. Sept-Oct		30 x 15	70 : 35.0 : 35.0	3000	2000

Ragi									
CO 7	100-105	1. Dec-Jan. } 2. May-June }	5	15 x 15	125 : 125 : 12.5	3400	—		
CO 10	90-95	— do —	5	15 x 15	60 : 30 : 30	3500	—		
CO 11	90-95	— do —	5	15 x 15	60 : 30 : 30	4000	—		
PR 202	110-120	1. April-May } 2. June-July }	5	15 x 15	125 : 12.5 : 12.5	4000	2500		
K 6	75-80	1. June-July } 2. Sept-Oct }	5	15 x 10	125 : 12.5 : 12.5	3750	2000		
Minor Millets									
CO 3	100	1. June-July } 2. Sept-Oct }	5	25 x 15	40 : 20 :	1100	—		
CO 4	65-00	— do —	5	"	"	600	—		
CO 5	95	— do —	5	"	"	1300	—		
Varagu									
CO 2	135	July-August	5	45 x 15	"	1000	—		
K 1	100	July-August	5	45 x 15	"	700	—		
Samai									
CO 2	80-85	1. July-August } 2. Sept-Oct }	5	25 x 15	"	800	—		
Panivaragu									
CO 1	70-75	1. July-August } 2. Sept-Oct }	8	15 x 10	"	1200	—		
Kudaraivalu									
CO 1	11	"	5	25 x 15	"	1600	—		
K 1	110	"	5	"	"	1400	—		

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pulses							
Redgram							
SA 1	180	June-July	10	90 x 30	12.5:25:0	1250	...
CO 2	120	Wetland bunds	50gm/100 met	30 cm between plants	"		
CO 3	125-130	1. Feb.-March 2. June-July	25	45 x 30	25:50:0	1200	400
Blackgram							
CO 2	65-70	Feb-April	20	30 x 10	25:50:0	1050	650
CO 3	70-75	Feb-April	20	30 x 10	25:50:0	1050	500
CO 4	70	1. Feb.-April 2. July-August	20	30 x 10	25:50:0	1050	650
KM 2	60-65	1. June-July 2. Sep.Oct 3. March-April	20	30 x 10	25:50:0	500	...
TMV1	65-70	Rice fallow	20	30 x 10	"	1400	...
ADT2	75	Rice fallow	20	30 x 10	"	1000	...
Greengram							
KM 1	60-65	1. June-July 2. Feb.-March	20kg	30 x 10	25 : 50 : 0	700	...
KM 2	65-70	1. June-July 2. Feb.-March	20	30 x 10	25 : 50 : 0	800	...

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sunflower								
K 1	85	All throughout the year	15	60 x 15	62.5:12.5:12.5	47	2200	100
K 2	65	April to August is the best season	15	30 x 15	62.5:12.5:12.5	49	2500	1100
Oilseeds								
Groundnut								
TMV 2	105	1. Dec-January 2. March-April 3. June-July	112.5	30 x 15	37.5:12.5:50	49.4	1250	—
TMV 7	105	1. Dec-January 2. March-April	112.5	30 x 15	37.5:12.5:50	40.6	1400	—
TMV 9	105	1. Dec-January 2. June-July	112.5	30 x 15	37.5:12.5:50	51.4	1525	—
TMV 11	105	June-July	112.5	30 x 15	37.5:12.5:50	49.0	1650	—
TMV 12	105	1. Dec-January 2. July-August	112.5	30 x 15	37.5:12.5:50	51.1	1650	—
CO 1	105	Same	112.5	30 x 15	37.5:12.5:50	50.4	1325	—

Cotton

						Kapas (kgs/ha)
MCU 5	165-170	1. June-August 2. August-Sept 3. Dec-March 4. Sept-November (Rainfed)	15	75 x 30	100:25:25	2000
MCU 6	180	Sept-November (Rainfed)	20	45 x 25	40:20:20	750
MCU 7	135-140	January-March (Rice fallow)	15	60 x 30	60:30:30	1250
MCU 8	165-175	December-March	15	75 x 30	90:40:40	1750
MCU 9	165-175	1. June-August 2. August-Sept	15	75 x 30	100:25:25	2100
Vara- lakshmi	180-190	1. June-August 2. August-Sept 3. December-March	3.75	120 x 30	162.5:25:75	2400
Savin	180-200	1. August-Sept	12.5	75 x 30	90:40:40	1750

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<u>Sugarcane</u>								
COC 671	10 months	1. December-January (Early) 2. June-September (Special)		75,000 two bud- ded or	N:P ₂ O ₅ :K ₂ O Assumed water supply area	CCS%	Cane yield T/ha 123.5	
COC 771	10 months	1. December-January (Early) 2. June-September (Special)		50,000 three budded/ ha	27.562.5:112.5		140.0	T/ha
COC 772	10 months	1. December-January (Early) 2. June-September (Special)			Water scarcity areas		143.3	,,
COC 773	10 months				235:62.5:112.5		97.5	,,
COC 774	11 months	Mid season (Sep-March)			<u>For Jaggery</u> <u>area</u>		159.8	,,
COC 775	11 months	Mid season (Sep-March)			175:62.5:112.5		122.5	,,
COC 776	11 months	Mid season (Sep-March)					112.3	,,
COC 777	12 months	Late season (April-May)					171.3	,,
COC 778	12 months						165.5	,,
COC 779	12 months						204.6	,,
CO 6304							115.0	,,

ANIMAL HUSBANDRY

The quality feed to be given to Dairy stock which includes cows in milk, dry cows, pregnant cows, young calves, heifers and breeding bulls. Work bullocks also can be fed with this quality feed to meet the requirements for their work.

1. Cows giving less than 5 litres of milk	2 kg of concentrate mixture of the quality feed
2. From 5 to 8 litres	3 kg
3. From 8 to 10 litres	4 kg
4. Above 10 and 15 litres	6 kg
5. Pregnant cows	2 kg
6. Young calves above six months and 1 year	1 kg
7. Young calves between 1 to 2 years	2 kg
8. Work bullock during heavy work	2½ kg
9. Breeding bulls	3½ kg

Ingredients	I	II	III	IV	V	VI	VII	VIII
1. Groundnut maize	20	30	—	20	25	—	28	20
2. Groundnut cake	25	28	27	28	25	33	25	25
3. Wheat bran	25	25	18	20	25	25	10	20
4. Cotton seed	—	—	—	10	23	—	—	10
5. Tapioca Flour	—	—	33	—	—	40	—	—
6. Tapioca waste (Thippi)	18	15	—	20	—	—	20	10
7. Molasses	10	—	—	—	—	—	—	—
8. Guar meal	—	—	20	—	—	—	15	13
9. Mineral mixture	2	2	2	2	2	2	2	2
Total	100	100	100	100	100	100	100	100

Green grass : 25 to 30 kg

or

Legume hay (lucerne) : 7 to 8 kg

(Paddy straw should be avoided for crossbred cow)

Pig feed (concentrate mixture)

Yellow maize	: 60 parts
Groundnut cake	: 20 parts
Wheat bran	: 13 parts
Fish meal	: 5 parts
Mineral Mixture	: 1.5 parts
Common salt	: 0.5 parts
Antibiotic feed supplement	: 100 gm/100 kg mash
Vitablend/Vitamin	: 12.5 gm/100 kg mash

FIVE YEAR PLANS

S. No.	Head	Three one Year plans							5th Five Year plan (1974-79)
		1st Five Year plan (1951-56)	2nd Five Year plan (1956-61)	3rd Five Year plan (1961-66)	1966-67		1968-69	4th Five Year plan (1969-74)	
					1967-68	1968-69			
(a) DISTRIBUTION OF ACTUAL OUTLAY (in crores of rupees)									
1	Agriculture and Community Development	291	530	1068	384	314	319	2728	4644
2	Major and Medium Irrigation	310	420	600	150	145	176	1087	3440
3	Power	260	445	1012	404	396	413	2448	7294
4	Village and Small Industries	43	175	264	43	42	41	293	—
5	Industries and minerals	74	900	1520	514	471	526	3338	10200
6	Transport and Communications	523	1300	1486	424	398	400	3237	6881
7	Social Services and miscellaneous	459	830	1500	296	319	361	2771	6844
Total		1960	4600	7500	2165	2085	2236	15902	39303

(b) FINANCIAL RESOURCES (in crores of rupees)

1	Balance from current revenues	...	50	550	...	...	...
2	Taxation and surpluses of Railways	732	150	100	...	...	...
3	Public loans (net)	205	780	1250	...	...	...
4	Small savings and unfunded debt	304	400	865	...	...	12438
5	Miscellaneous capital receipts (net)	198	230	275	...	...	32522
6	External Assistance	188	1090	2200	...	...	2614
7	Deficit financing	333	948	550	...	...	850
8	Additional taxation	...	1052	1710	...	...	...
		1960	4700	7500	...	...	15902
							39308

Various Financial Institutions Providing Credit Facilities to Industries in India

1. Industrial Finance Corporation of India (IFC)
2. State Financial Corporation (SFC)
3. Industrial Credit and Investment Corporation of India (ICICI)
4. Industrial Development Bank of India (IDBI)
5. Industrial Reconstruction Corporation of India
6. Commercial Banks (including State Bank of India)
7. The Reserve Bank of India

HINTS FOR THE CULTIVATION OF FORAGE CROPS

Crops	Soil	Manures (Basal dose)	Seeds & sowing	Manures (Top dress)	Irrigation	Harvesting	Yield
Guinea grass	Well drained Loamy soil; also comes up well under sewage conditions	N — P — K 50 - 50 - 40 at planting time F.Y.M. or compost at 25 t/ha (Basal)	*Slips in ridges and furrows 50cm apart; 20-25,000 slips per ha. at 50cm inter-space	50kg N2 after each cut, if grown with well water	First 2-3 irrigations at weekly intervals and then, once in 10 days	First cut 60th day after planting; subsequent cuts 30 days apart	10-12 tonnes/ha/cut (10-12 cuts per year) Quartering to be done after 2-3 days
Cumbua-Napier Hybrid B N. 2	Well drained loamy soil, preferable comes under sewage also	—do—	—do—	—do—	—do—	First cut 60 days after planting subsequent cuts at 40-45 days	20-25 tonnes/ha/per cut per year Quartering to be done after 2-3 years
Water grass (Para)	Loamy or clayey soils, Best for swamp wet-	—do—	—do—	—do—	Since it is grown in	First cut after 60th days & sub-	10-12 tonnes per cut. (10-12 cuts per year)

grass lands; ideal for
or Bufflo sewage conditions
grass

swamps sequent Quartering
no cuts at 30 to be done
frequent days after 2-3
irrigations interval Years)
may be
necessary

Lucerne (Alfalfa)	Well drained loamy soil preferable; water stagnation is detrimental to crop growth	N — P — K 251-700-140 at planting	October November Broadcast or in lines, seeds 15 kg/ha lines 20 cm apart seeds to be inoculated with bacterial culture*	No top dressing after each cut	Weekly once for the first month and there after once in 10 days	First cut 60th day and sub- sequent cuts 25-30 days apart	7.5 tonnes/ ha/cut (10-12 cuts per year) Economical to maintain the crop for one year
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*Culture available with Professor of Biology T.N.A.U. Coimbatore-641 003.

PLANT PROTECTION MEASURES

S. No.	Name of the Chemical	Action	Formulations	Dosage	Pests against which recommended
1	2	3	4	5	6
I. INSECTICIDES					
A Chlorinated Hydrocarbons					
1.	BHC	Contact, stomach and fumigant insecticide	10% dust 50% WP	20-25 Kg/ha 1 kg/60 litres water	Thrips, earhead bugs, caterpillars, termites, ants, grass-hoppers, fulgorids Not to be used on cucurbits.
2.	DDT	Contact	3% dust 5% " " 10% " " 50% WP 25% EC aerosols	20-25 kg/ha 20 " " 10-15 " " 200 gm/100 litre water 600ml/100 litre water	Green jassid, swarming caterpillar, case worm of paddy, cutworm, redgram pod borer, gingelly leaf and shoot webber, mango hopper, Bollworm of cotton, Leaf eating caterpillars, Mosquitoes, House flies, Phyto-toxic on cucurbits, young tomato plants and beans.
3	Endrin	Contact Broad spectrum insecticide	2% dust 2% G 20% EC	20-25 kg/ha 10-15 kg/ha 100ml/100 l. water	Pests of paddy, cholam, cotton chillies thrips, caster semilooper, red hairy caterpillar on groundnut, sugarcane early borer, vegetable caterpillars. Use near harvest on fruits, vegetables and fodders should be avoided.

Paddy stem borer, Cotton bollworms, cholam stemborer, sugarcane early borer, tomato fruit borer, Bhandi pests, G. nut red hairy caterpillar, surulpoochi, tobacco aphids thrips, jassids, etc.

Aphids, white flies, bugs, scales beetles weevils, thrips, grasshoppers, miles, cater pillars of cotton, rice, citrus, coffee, sugarcane, groundnut and vegetables. Sorghum shootfly, sucking insects in Brinjal, aphid, jassid and thrips of cotton.

Pests in early stages of cotton, banana, weevil, soil inhabiting insects, Golden nematode of potato. Paddy stem borer, gall fly, jassids, mango fruitfly, nut weevil, bittergourd, fruitfly. Bhandi jassid. castor capsule borer, coconut red-palm weevil. Turmeric leaf thrips. Mosquitoes, flies.

Stored product pests, earhead pests of cholam, castor capsule borer, cotton aphid, Tapioca scale, Betalvine scale, Tea mosquito bug, diamond backmoth & aphids on

20-25 kg/ha
5-7
200ml/100 water

4% dust
4% G
35% EC

Contact Stomach
Fumigant

4. Endosulfan

B. Organo Phosphorus Compounds

100ml/100 litre
water

contact & systemic
insecticide &
acaricide. 24% EC

1. Dicrotophos

3g/metve row
1.5 - 2.0 kg ai/ha

5% G

Systemic
insecticide

2. Disulfoton

1-2 kg ai/ha

5% G
10% G

Systemic insecticide
nematocide

3. Fensfiothion

200 ml/200 l. water

20% EC

Systemic and
contact
insecticide

4. Fenthion

100% EC

insecticide

5. Malathion

100 kg/ac
200 ml/100 l. water

5% dust
50% EC

Contact
insecticide

1	2	3	4	5	6
6.	Parathion (ethyl)	contact	2% dust 50% EC	10 kg/ac 100 ml./100 l. water	cabbage and cauliflower. Tobacco stem borer, Sugarcane pyrilla mealy bugs and scales.
7.	Methyl parathion	contact	2% dust 50% EC	10kg/ac 100ml/100 l. water	Paddy and cotton pests, suruli poochi of G. nut castor capsule borer and semi looper, Tapioca scale thrips, alerodids, mites and mealy bugs.
8.	Phorate	Soil and systemic insecticide	10% G	1.5g/meter row 1.5 - 2.5 ai/ha	Paddy pests, cotton pests, scales, mealy bugs, white flies and jassids
C. Carbomates :					
1.	Carbaryl	contact	50% WP 10% dust 2.5% dust 50% dust 4.0% G	200g/100 l. water	Sorghum shootfly, cotton sucking pests, stem weevil, paddy gallfly.
2.	Carbofuran	Systemic insecticide nematicide	3% G 20% EC 40% W/W Flowable- 50% SP	5% seed treatment 15 - 2.0 kg ai/ha soil appln. 100 ml/ 100 litre water	Cotton pests including Spodoptera. Sorghum pests, castor pests, vegetable pests, coconut redpalm weevil, mango hopper, grapevine thrips.
					Sorghum shootfly, stem borer, major pests of paddy including nematodes. Nursery treatment of chillie aphids, nematodes. Rose scale. Jasmine Eriophyid mite; grapevine and banana nematode Seed treatment in sorghum, bhendi.

II. ACARICIDE

1.	Carbophenotion	—	2% dust 3% dust 20% EC	40 - 50 kg/ha 300ml/100 l. water	Mites of all crops, oricidal action also.
2.	Demeton	—	50% EC	200ml/100 l water	Mites
3.	Dicofol	—	18.5% EC	250ml/100 l. water	Cotton mites
4.	Dithioquinox	—	25.0% EC	299g/100 l. water	Brinjal mites, castor mites
5.	Methyl demeton	—	25.0% EC	100ml/100 l. water	Acaricide and insecticide
6.	Sulphur	—	dust	15-20 kg/ha 200g/100 litres water	Mites

III. NEMATOCIDES

1.	Aldicarb	—	10% G	2.5 kg/ha	Nematodes
2.	Dibromichloro- prepani	—	50% EC	30 l./ha/as preplant appln. 18 l./ha past plant appln.	Root knot nematodes chilli nematodes tomato " Bhendi "
3.	Disulfotan	—	5% G	3g/meter row	Insecticide & Nematocide
4.	Fansulfothion	—	10% G	2-2.5 kg a/ha	Golden Nematode of potato
5.	Phorate	—	10% G	1.5g/water row	Nematocide and Insecticide

1	2	3	4	5	6
IV. RODENTICIDES					
1.	Aluminium	—	3g-tablet	$\frac{1}{2}$ per burrow	Rat
2.	Barium Carbonate	—	—	1 part with 4 parts of bait	" "
3.	Cal. Cyanide	—	42.3% dust of ca (CN) ₂	rat burrow fumigation	" "
4.	Coumarin	—	EC	1 part in 14-19 parts of water	Field rats
5.	Warfarin	—	2% dust	one part in 20 parts of bait	Rodents paddy crops
6.	Zinc phosphide	—	Fine granules	1 part in 19 parts of bait	Rat
V. FUMIGANTS					
1.	Alphophide	—	0.5-3g tablet	2 tab/ton grain	Stored product pests
2.	Calcium cyanide	—	42.3% dust	$\frac{1}{2}$ -1.5kg/28m ³	Stored product pests Rodents in burrow
3.	Carbon disulphide	—	Liquid	1.5-2.0 kg/28m ³	Stored product pests

PESTICIDES

Sl. No.	Name of the Chemical	Formulation	Dosage	Pests against which generally recommended
1	2	3	4	5

FUNGICIDES

A. *Copper Group*

1.	Bordeaux mixture	...	Copper sulphate 2½ kg. Lime 2½ kg. 225 lit. water	Sprayed against blast of paddy. Leaf spot diseases of all crops (except Sorghum.) Soil drench for damping off and betelvine wilt. It remains the most efficient fungicide.
2.	Copper (Oxy-chloride)	42.50% W. P.	1 kg. in 400 lit. of water.	Copper sprays control many blights, leaf spots, downy and powdery mildews Effective against BLO on paddy used at 400-500 gm./acre
3.	Cuprous Oxide	42.50%	do	do

B. *Orangano Mercurial Group*

1.	Agrosan G (Tolymcury acetate and Ethyl mercury chloride)	Dry seed dresser	2 gm. per kg. of seed	Seed treatment to control seed borne diseases of all crops (helminthosporium and foot rot.)
2.	Ceresan (dry) (Phenyl Mercury acetate)	do	do	do

1	2	3	4	5
3.	Ceresan (wet) (Methoxy ethyl mercury chloride)	3% W.P.	1 kg. in 1,000 lit. of water.	Soil drench against soil borne diseases (foot rot wilt, damping off etc.)
4.	Aretan (2-methoxy Mercury chloride)	6% W.P.	$\frac{1}{2}$ kg. in 200 lit. of water	Wet seed dip or sett treatment in sugarcane prior to planting, for sett rot disease.
5.	Agallol (Methoxy ethyl mercury chloride)	3% W.P.	1 kg. in 200 lit. of water	do

C. Sulphur Group

1.	Sulphur pure form and as Barium polysulphide.	Dust	Seed treatment for 4 gm. per kg. of seed. For dusting. 10 kg per acre.	Seed treatment for seed borne disease of smut of sorghum and as dust against powdery mildew and rusts of all crops.
----	---	------	--	---

D. Tin Group:

1.	Duter (Triphenyl Stannous hydroxide)	W. P.	1 kg. in 500 lit. of water	As spray to control leaf spot diseases, late blight of potato, downy mildew and anthracnose of grape vine, tikka of groundnut and paddy blast.
2.	Brestan (Triphenyl Stannous acetate)	W. P.	1 kg. in 1000 lit. of water	Do.

1	2	3	4	5
---	---	---	---	---

E. Nickel Group :

- | | | | | |
|----|------------------------|-------|----------------------------|---|
| 1. | Nickel chloro-
ride | W. P. | 2 gm. per lit. of
water | Effective for blister
blight of tea. |
|----|------------------------|-------|----------------------------|---|

F. Organic Fungicides :

Dithiocarbamates

- | | | | | |
|----|---|-----------------|---------------------------------|--|
| 1. | Dithane
Z-78 (Zinc
ethylene
bisdithio-
carbamate) | 75-78%
W. P. | 1 kg in 500 lit.
of water | For leaf spot
diseases of all crops. |
| 2. | Maneb,
Dithane
M-45
(Manganese
ethylene bis-
dithiocarba-
mate) | W. P. | 1 kg. in 500 lit.
of water. | Spray for late blight
and early blight of
potato and tomato. |
| 3. | Ziram (Zinc
dimethyl) | 80% W. P. | 1 kg. in 1000
lit. of water. | Spray for leaf spot
diseases of all
crops. |
| 4. | 70% Zinc
cattivated
poly ethy-
lene thiram
disulphide | 70% W. P. | 1 kg. in 540
lit. of water | Foliar spray against
leaf spot diseases. |
| 6. | Combination
of copper
Oxychloride
(37%) and
Zineb (13%) | W. P. | 1 kg. in 500 lit.
of water. | Late blight of
potato and other
leaf spot diseases. |

1	2	3	4	5
6.	Combination of copper Oxychloride (13%) and Zineb (20%)	80% W. P.	1 kg. in 500 lit. of water.	Late blight of potato and other leaf spot diseases.

1. Other more Recent Formulations :

1. Difolatan 80% W. P. 1 kg. in 1000 lit. of water. Used to control late blight of potatoes, anthracnose and downy mildew of grapes. Scab, sooty, blotch and fly speak of apples banana leaf diseases and helminthosporiosis of paddy.

2. Benomyl or Fungicide 1991 (Methylbutylcarbamoyl) (2-benzimidazole carbamate) W. P. 1 kg. in 1000 lit. of water. Systemic fungicide with wide spectrum of fungicidal activity for seed soil or foliar application for control of several foliar diseases, rice blast powdery mildew verticillium and Rhizoctonia diseases.

PST mixtures

Amureb: Co: RE: S - 3:1:1:5

Rocen: FYM: RE: S: LM - 6:4:3:2

Tobacco: RE: FYM: S: LM: LS - 2:2:2:2:1

Craynot: Shrub - FYM: RE: LM: S - 2:2:2:1

Penas: ^{LP} FYM: S: M: LS: B - 4:3:2:2:1

Sacubak: LM: RE: FYM: S - 2:2:1:1

note for smaller plants, Rhizoctonia may be added.

COMPATABILITY OF MANURES VS FERTILISERS

HOME MIXING OF MANURES AND FERTILISERS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Ammonium Phosphate	R	X	O	X	O	O	X	R	O	R	O	R	R	X	R
2 Basic Slag	X	R	R	R	O	R	R	R	R	R	O	X	R	X	X
3 Bone Meal	R	R	R	R	R	R	R	R	R	R	O	R	R	R	O
4 Calcium Cyanamide	X	R	R	R	O	R	R	O	R	R	O	X	R	X	X
5 Dried Blood	O	R	R	O	R	O	O	R	R	O	O	R	R	R	R
6 Lime - (Ca CO 3)	O	R	R	R	O	R	R	R	R	R	O	O	R	O	X
7 Lime Burnt (CaO)	X	R	R	R	O	R	R	R	R	R	O	X	R	X	X
8 Muritate of Potash	R	R	R	R	R	R	R	R	R	R	O	R	R	R	R
9 Nitrate of Soda	O	R	R	R	R	R	R	R	R	R	O	R	R	R	R
10 Potassium Nitrate	R	R	R	R	R	R	R	R	R	R	O	R	R	X	R
11 Potash Salts	O	R	R	O	O	R	R	O	O	R	O	R	R	X	R
12 Sulphate of Ammonia	R	X	X	X	R	O	X	R	R	R	O	R	R	R	R
13 Sulphate of Potash	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
14 Super Phosphate	X	X	R	X	R	O	X	R	X	X	R	R	R	R	R
15 Urea	R	X	O	X	R	X	X	R	R	R	R	R	R	R	R

MIXED OR COMPOUND FERTILISERS

To avoid caking and losses from incompatibility of materials certain ingredients should not be mixed together.
 X -- Do not mix. O -- Use immediately after mixing R -- May be mixed together and stored for a few days.

CLASSIFICATION OF IRRIGATION WATER UNDER DETAILED ANALYSIS

Quality of water.	m. mhos/cm.	P.H.	Na. %	Cl. me/litre.	SAR.	R. S. C.
1. Excellent.	0.5	6.5-7.5	30	2.5	1	1.0
2. Good	0.5-1.5	7.5-8.0	30-60	2.5-5.0	1-2	1.0-1.25
3. Fair	1.5-3.0	8.0-8.5	60-75	5.0-7.5	2-4	1.25-2.0
4. Poor	3.0-5.0	8.5-9.0	75-90	7.5-10	4-8	2.0-2.5
5. Very poor	5.0-6.0	9.0-10	80-90	10-12.5	8-15	2.5-3.0
6. Unsuitable.	6.0	10	90	12.5	15	3.0

S. A. R. - Sodium Absorption Ratio
R. S. C. - Residual Sodium carbonate.

MICRONUTRIENTS APPLICATION RATE/HECTARE

(Safe Range.)

Elements	Form	Soil	Foliar
I. Iron	Ferrous sulphate	10-30 kg.	3-5 kg. in 180-360 lit. of water.
II. Manganese	MnSO ⁴ .	10-30 kg.	2 to 4 kg. in 180 to 360 lit. of water
III. Zinc	ZnSO ⁴ .	3-25 kg.	1 to 10 kg. in 180 to 360 lit. of water.
IV. Copper	CuSO ⁴ 5H ₂ O	1-25 kg.	$\frac{1}{4}$ to 1 kg. in 180 to 360 lit. of water
V. Boron	Sodium Borete.	3-10 kg.	$\frac{1}{2}$ to 3 kg. in 180 to 360 lit. of water.
VI. Molybdenum.			
1. Sodium Molybdate		100 gm.-1 kg.	7 gm. to 225 gm. in 180 to 450 lit. of water.
2. Ammonium Molybdate		100-500 gm.	7 gm. to 225 gm. in 180 to 450 lit. of water.

CONVERSION TABLES

UNITS OF AREA

Acres:	Metric,
640 Ac	250 Ha
247 Ac	100 Ha
24.71 Ac	10 Ha
10 Ac	4.047 Ha
2.471 Ac	1 Hectare
1 Acre	0.4047 Hectare

RECLAMATION OF ACID AND ALKALINE SOILS

The acidic and alkaline soils can be corrected by the application of lime and gypsum respectively as detailed below.

Acidic soils (PH below 6.0)		Alkaline soils	
Soil PH	Lime to be added in split doses kgs./acre	Soil PH	Qty. of Gypsum to be added kg./acre
5.9	455	8.1—8.9	Addition of liberal quantity of Organic matter. Green manures etc.
5.8	680	—	—
5.7	905	9.00	1000
5.6	1135	9.1	1400
5.5	1360	9.2	1800
5.4	1590	9.3	2200
5.3	1815	9.4	2600
5.2	2040	9.5	3000
5.1	2260	9.6	3400
5.0 and below	2495	9.7	3800
		9.8	4200
		9.9	4600
		10.0	5000

HORTICULTURE HINTS FOR VEGETABLE CULTIVATION

Name of Vegetable (1)	Varieties (2)	Duration (days) (3)	Seed rate per ha (4)	Season (5)	Fertilizer dose (kg/ha) (6)	Yield t/ha (7)
Amaranthus	CO 1	90	3 kg.	Throughout the year	FYM 25 tonnes NPK : 75-25-25 (Basal)	6.57
	CO 2	85-90	10 kg.	"	"	10.78
Tomato	CO 1	135	400 g	<u>Sowing</u>	FYM 25 tonnes (Basal)	37.5
	CO 2	145	400 g	May-June	NPK : 75:100:25	41.8
	Pkm 1	135	500 g	Nov-Dec	Zinc sulphate: 20 "	32.0
				Feb-March	Borax : 10 "	
Bhendi	CO 1	90	6-7 kg	Throughout the year	Basal : 25 tonnes of FYM NPK : 20:50:25	14.20
	MDU 1	90				9.40
Brinjal	CO 1	160	—	Summer, monsoon	Basal : FYM 25 tonnes NPK : 100:80:25 Top, Am. sulp: 250 kg	24.90

1	2	3	4	5	6	7
	MDU 1	135-145	400 g	June-Nov. Nov-April Feb-June	FYM 25 tonnes PK 50-50-50 kg (Basal) N. top : 50 kg	33.69
Snakegourd	CO 1	135	1.5 kg	July-Dec. Jan-June	<u>Per pit</u> <u>Basal :</u> FYM : 10 kg	18.28
	PKm	145	1.5	Summer mansoon season	100 g of standard mixture No. 6/plant (Basal) 50 g Am. sulphate/ plant (Flowering)	24.45
Ribbed gourd	CO 1	135	1.5 kg	January-April May-August Sep-Dec.	100 g of standard mixture No. 6/plant (Basal) 50 g of Am. sulphate/plant (Flowering time)	14.14
Pumpkin	CO 1	175	1 kg	June-July to Oct-Nov	,,	29.68
	CO 2	125	1 kg	January-June	,,	22.65

OCT-NOV
January-June
..
22.65

CO 2
125
1 kg

Bittergourd CO 1 115 2.5 kg June-July 14.44
January-February Basal: FYM 25 t
NPK-40-30-60

Ash gourd CO 1 150 2.5 kg June-July 20.25
Nov-Dec Basal: 10 kg of
FYM 100 g of fert
mixture
Topdress: 100 g of
Amn. sulphate

Onion CO 1 90 --- April-August 10
Oct-Feb Basal:
NPK 30:60:30

CO 2 65 --- April-Aug 12
Oct-Feb Topdress 30:0:0

CO 3 65 --- " 15.83

MDU 1 65-75 --- Summer, mon- 14.90
soon winter

Chilli K1 }
K2 }
CO 1 } 210 1.5 Kg. All 3 season
MDU 1 } June-July
Sep-Oct N: 70 Kg 1.7(dry pod)
1.9(dry pod)
2.1
1.8

1	2	3	4	5	6	7
Topioca	CO 1	255-270	17,000 setts	September throughout the year	Basal : 12-15 tonnes of FYM NPK: 50:50:100 half at the time of planting and rest after 3 months	30
Sweet Potato	CO 1	135	72,000 terminal cuttings	Sep.	Basal : 10 tonnes of FYM Npt 40:80:120 as top dressing	28.0
Carrot	Pusakesar Half long Bankers India gold	100-120	3 kg	Aug-Dec.	Basal: 30 tonnes of FYM NPK: 50-50-80 Top: 50 kg N	10-12
Radish	Pusarashmir Bombay long white pusa chatki	40-45	3-4 kg	Aug-July throughout the year	Basel: FYM 15-20 tonnes NPK 25:100:50 Top: 25 Kg N	25-30

Cauliflower	Mammoth Maghe, Milky white Silvery king snow ball	90-120	400g	Sep.-Feb	Basal : FYM 30 tonnes NPK 50:100:50 Top: 50 kg N	10.0
Cabbage	1. Large Early Drum Head, 2. Early Autumn Giant, 3. Jersey wake Field 4. September (for Nilgiris)	100-150	400g	Aug.-Feb	Basal : FYM: 20 tonnes NPK50:100:50 Top: 50 Kg. N.	15-20
Peas	Bonneville Telephone Blue Banhum	120-140	200 kg	Oct-Jan	Basal : FYM: 12 tonnes NPK: 50: 60: 30	5-7
French bean	Master piece Bountiful Kentucky won- ders Runner French white	90-120	60 kg	Oct-Jan	Basal : 12 tonnes of FYM NPK: 50:100:50 Top: 50 kg N	9-14 (Bush) 14-19 (Pole)

AGRICULTURAL MICROBIOLOGY

- (i) **Symbiotic nitrogen fixation:** Efficient rhizobial strains various pulse crops in Tamil Nadu have been identified after screening in pot culture and field trials. During the year 4 rhizobial strains were identified as efficient strains for blackgram, 3 each for greengram, redgram, cowpea and horsegram and 2 for bengalgram.

The effect of single and multistrain inoculants of rhizobium on the yield of various crops revealed that in blackgram (CO, 4) while single strain enhanced the yield upto 16.6%, multistrain increased the yield by 32.5%. Similarly in greengram (CO.3) single strain increased the yield by 59.0%. and that of multistrain 72.0%. In redgram (CO.3) single strain enhanced the grain yield by 38.4%. and multistrain 43.2%. Multistrain treatment in bengalgram (CO.1) enhanced the yield by 44.6% as against 10.5% in single strain. Horsegram responded well to the treatment of multistrain (36.5% increase) than single strain treatment (22.1%).

- (ii) **Non-symbiotic nitrogen fixation :**

Number of field trials were conducted to know the effect of *Azotobacter* inoculation either alone or in combination with other bacterial inoculants like *Bacillus polymyxa*, *B.megaterium*, *Azospirillum*, etc., on different crops (rice, maize, ragi, cholam, cumbu, sunflower, sweet-potato, tapioca, cotton, carrot, cabbage, potato, etc.) In all these studies the results indicated a possible saving of fertilizer nitrogen to an extent of 25-30% without affecting the grain yield due to either *Azotobacter* treatment alone or combinations of different organisms.

- (iii) **Generation of biogas utilizing agricultural wastes :**

Incorporation of chopped materials of (i) *Parthenium* weeds (ii) *Saranai* and (iii) *Banana* peduncle along with cowdung and old slurry in the proportion of 1 : 4 : 1 (v/v) over a period of 12 weeks resulted in the generation of maximum amount of gas (1422 cc/day) by *parthenium* incorporation followed by *saranai* incorporation (1294 cc/day) as against a control (cowdung + old slurry alone) of 711 cc/day.

SOIL SCIENCE

Nutrient content of fertilizers

(Percent by wt.)

Material	Total Nitrogen (%)	Ammoniacal Nitrogen (%)	Nitrate Nitrogen (%)	Amide Nitrogen (%)	Total Phosphate	Available Phosphate (P ₂ O ₅)	Water soluble Phosphate (P ₂ O ₅)	Water Soluble Potash (K ₂ O)
I. Nitrogenous fertilisers								
1. Ammonia	—	—	—	—	—	—	—	—
2. Ammonium sulphate	20.6	20.6	—	—	—	—	—	—
3. Ammonium chloride	25.0	25.0	—	—	—	—	—	—
4. Ammonium sulphate nitrate	26.0	19.3	6.8	—	—	—	—	—
5. Calcium ammonium nitrate	25.0	12.5	12.5	—	—	—	—	—
6. Urea	46.0	—	—	—	—	—	—	—
II. Phosphatic fertilizers								
7. Bonemeal-steamed	—	—	—	—	22.0	16.0	—	—
8. SSP	—	—	—	—	—	—	16.0	—
9. TSP	—	—	—	—	46.0	—	42.5	—
10. Dicalcium phosphate	—	—	—	—	—	34.0	—	—
III. Pottassic fertilizers								
11. Potassium chloride	—	—	—	—	—	—	—	58.0
12. Potassium sulphate	—	—	—	—	—	—	—	48.0
IV. Compound and complex fertilizers								
13. Diammonium phosphate	18.0	18.0	—	—	46.0	46.0	41.0	—
14. Monoammonium phosphate	11.0	—	—	—	52.0	52.0	44.2	—
15. Nitro-phosphate 20-20-0	20.0	—	—	—	20.0	20.0	5.4	—
18-18-9	18.0	—	—	—	18.0	18.0	4.9	—
15-15-15	15.0	—	—	—	15.0	15.0	4.0	15.0

SOIL FERTILITY STATUS OF TAMIL NADU

S. No.	District	Available		
		Nitrogen	Phosphate	Potash
1.	Chingleput	Low	Low	—
2.	North Arcot	Low	Low	—
3.	South Arcot	Low	Medium	—
4.	Dharmapuri	Low	Medium	—
5.	Salem	Low	Medium	Low
6.	Nilgiris	Medium	Medium	Low
7.	Coimbatore	Low	Medium	Low
8.	Tiruchirapalli	Medium	High	—
9.	Thanjavur	Low	Low	Low
10.	Pudukkottai	Medium	High	—
11.	Madurai	Low	Low	—
12.	Ramanathapuram	Low	Low	—
13.	Tirunelveli	Low	Medium	—
14.	Kanyakumari	Medium	Low	—

SOIL TESTING RANGES (Kg/ha)

	Low	Medium	High
Available N	0-280	280-450	450
Available P	0-11	11-22	22
Available K	0-119	119-280	280

UPTAKE OF NUTRIENTS BY CROPS

Crop 1	Yield/ha 2	N 3	P ₂ O ₅ 4	K ₂ O 5
Cereals				
Wheat	6.0t	170	75	175
Oats	3.6t	130	45	160
Rice	6.0t	100	50	180
Maize	8.4t	200	80	230
Sorghum	2.2t	115	50	120
Root and tuber crops				
Potato	40t	175	80	310
Sweet potato	40t	190	75	390
Cassava or manioc	40t	120	70	350
Fruits				
Apples	28t	100	45	180
Grapes	20t	170	60	220
Citrus	28t	265	55	330
Pineapples	55t	205	60	390
Bananas	40t	250	60	1000
Vegetables				
Tomatoes	40t	110	30	150
Carrots	30t	125	55	200
Cabbage	70t	370	85	480
Cauliflower	25t	250	100	315
Spinach	25t	120	45	160
Pole beans (green)	15t	130	40	160
French beans (green)	10t	170	40	205
Pulses (dry grain)				
Beans	2.4t	155*	50	120
Broad beans	2.4t	160*	45	120
Peas	2.0t	125*	35	80
Oil crops				
Groundnut or Peanut	2t	170*	30	110
Soya beans	3t	220*	40	170

*Leguminous plants can obtain most of their nitrogen from the air

1	2	3	4	5
Stimulants				
Coffee	1.5t clean coffee	120	30	130
Tea	2.5t made tea	160	40	90
Tobacco	2.0 dry leaf	130	40	240
Chillies	5.0t dry	220	45	340
Black pepper	7.0t fruit spikes, dry	240	40	210
Fibre crops				
Cotton	1.5 lint	180	65	130
Jute	2.0 fibre	65	30	160
Rubber	2.5 dry latex	60	30	65
Sugar cane	120t	130	105	410

III. Critical limits of micronutrients

General

- | | | | |
|----------------|---|----------|---|
| 1. Zinc | : | 0.5 ppm | NH ₄ OAC & 1%
Dithizone extractable |
| 2. Copper | : | 0.5 ppm | N. NH ₄ OAC
extractable |
| 3. Iron | : | 2.0 ppm | 4.8 PH NH ₄ OAC
extractable |
| 4. Manganese: | | 3.0 ppm | Exchangeable
N. Neutral NH ₄ OAC
extractable |
| 5. Boron | : | 0.1 ppm | Hot water soluble |
| 6. Molybdenum: | | 0.05 ppm | Acid Ammonium Oxtilate |

Critical limits of Tamil Nadu Soils

- | | | | |
|-----------|---|---------|--------------------|
| 1. Zinc | : | 1.2 ppm | } DTPA extractable |
| 2. Copper | : | 1.2 ppm | |
| 3. Iron | : | 3.7 ppm | |

MICRONUTRIENTS APPLICATION RATE (kg/ha)

(See Page No. 37)

(A)

(B)

(C)

- | | | |
|----|---|--|
| 4. | Fuel pump out of order. | Examine for broken drive, slipping coupling or worn parts. |
| 5. | Governor out of order. | Check for sticking, broken or worn parts. |
| 6. | Transfer or booster fuel pump does not function. | Check for broken drive or worn parts. |
| 3. | Smokyexhaust. | |
| 1. | Engine is overloaded (overloading not only increases the maintenance cost but also shortens the life of engine) | Avoid the chances for over-loading and check properly. |
| 2. | Fuel nozzle check valve is leaking. | Examine check valve and regrind if necessary. |
| 3. | Fuel nozzle tip holes are plugged or worn on one side | Take out nozzle, test in a nozzle tester and clean or replace the tip. |
| 4. | Injection nozzle valve strike in open position or dirt or valve setting. | Clean the injection nozzle unit. |
| 5. | Air filter partly or wholly choked. | Clean the air filter. |
| 4. | Overheating of the engine. | |
| 1. | Flow of cooling water is insufficient. | Increase flow. |
| 2. | Water circulating pump is belt drive belt is slipping. | Adjust belt. |
| 3. | Scale deposits on cylinder head water jackets. | Change jackets. |
| 4. | Insufficient lubrication of the piston. | Cylinder hand must be checked and adjusted. |

- | | |
|--|--|
| <p>5. Lubricating oil is poor dirty or diluted with fuel.</p> <p>6. Clogged lub oil filters.</p> | <p>Renew oil</p> <p>Filters must be cleaned and elements replaced where needed.</p> <p>Clean air cleaner properly.</p> |
| <p>5. Excessive fuel consumption.</p> <p>1. Partially clogged air cleaner.</p> <p>2. Low engine compression.</p> <p>3. Excessive rolling resistance i. e. dragging brakes, tight bearing etc.</p> <p>4. Leakages in fuel supply system</p> | <p>Correct it after carefully locating the cause for the same.</p> <p>Correct as necessary.</p> <p>Correct the affected parts.</p> |
| <p>6. Excessive engine oil consumption.</p> <p>1. External oil leakages from any point mainly; valve cover, drain plug, front or rear main bearing oil seals, oil filter gaskets.</p> <p>2. Clogged oil suction pipe or return pipe.</p> <p>3. Clogged oil breather.</p> <p>4. Excessive oil pressure.</p> <p>5. Cylinders distortion due to improper tightening of cylinder head nuts.</p> <p>6. Worn main big end bearings.</p> <p>7. Too much oil in the crank case</p> <p>8. Oil too thin.</p> | <p>Eliminate leakage from all parts after careful observation of their functioning</p> <p>Clean the pipes.</p> <p>Clean the engine.</p> <p>Remove the cause of the same.</p> <p>Tight the concerned nut correctly.</p> <p>Repair as needed.</p> <p>Maintain the correct oil level as per given mark or the gaugc i. e. dipstick.</p> <p>Change the oil and use the one of recommended grade.</p> |

LOGARITHMS

											Mean Differences								
	0	1	2	3	4	5	6	7	8	9	1			4			7		
											1	2	3	4	5	6	7	8	9
10	0000	0043	0086	0128	0170	0212	0253	0294	0334	0374	4	8	12	17	21	25	29	33	37
11	0414	0453	0492	0531	0569	0607	0645	0682	0719	0755	4	8	11	15	19	23	26	30	34
12	0792	0828	0864	0899	0934	0969	1004	1038	1072	1106	3	7	10	14	17	21	24	28	31
13	1139	1173	1206	1239	1271	1303	1335	1367	1399	1430	3	6	10	13	16	19	23	26	29
14	1461	1492	1523	1553	1584	1614	1644	1673	1703	1732	3	6	9	12	15	18	21	24	27
15	1761	1790	1818	1847	1875	1903	1931	1959	1987	2014	3	6	8	11	14	17	20	22	25
16	2041	2068	2095	2122	2148	2175	2201	2227	2253	2279	3	5	8	11	13	16	18	21	24
17	2304	2330	2355	2380	2405	2430	2455	2480	2504	2529	2	5	7	10	12	15	17	20	22
18	2553	2577	2601	2625	2648	2672	2695	2718	2742	2765	2	5	7	9	12	14	16	19	21
19	2788	2810	2833	2856	2878	2900	2923	2945	2967	2989	2	4	7	9	11	13	15	18	20
20	3010	3032	3054	3075	3096	3118	3139	3160	3181	3201	2	4	6	8	11	13	15	17	19
21	3222	3243	3263	3284	3304	3324	3345	3365	3385	3404	2	4	6	8	10	12	14	16	18
22	3424	3444	3464	3483	3502	3522	3541	3560	3579	3598	2	4	6	8	10	12	14	15	17
23	3617	3636	3655	3674	3692	3711	3729	3747	3766	3784	2	4	6	7	9	11	13	15	17
24	3802	3820	3838	3856	3874	3892	3909	3927	3945	3962	2	4	5	7	9	11	12	14	16
25	3979	3997	4014	4031	4048	4065	4082	4099	4116	4133	2	3	5	7	9	10	12	14	15
26	4150	4166	4183	4200	4216	4232	4249	4265	4281	4298	2	3	5	7	8	10	11	13	15
27	4314	4330	4346	4362	4378	4393	4409	4425	4440	4456	2	3	5	6	8	9	11	13	14
28	4472	4487	4502	4518	4533	4548	4564	4579	4594	4609	2	3	5	6	8	9	11	12	14
29	4624	4639	4654	4669	4683	4698	4713	4728	4742	4757	1	3	4	6	7	9	10	12	13
30	4771	4786	4800	4814	4829	4843	4857	4871	4886	4900	1	3	4	6	7	9	10	11	13
31	4914	4928	4942	4956	4969	4983	4997	5011	5024	5038	1	3	4	6	7	8	10	11	12
32	5051	5065	5079	5092	5105	5119	5132	5145	5159	5172	1	3	4	5	7	8	9	11	12
33	5185	5198	5211	5224	5237	5250	5263	5276	5289	5302	1	3	4	5	6	8	9	10	12
34	5315	5328	5340	5353	5366	5378	5391	5403	5416	5428	1	3	4	5	6	8	9	10	11
35	5441	5453	5465	5478	5490	5502	5514	5527	5539	5551	1	2	4	5	6	7	9	10	11
36	5563	5575	5587	5599	5611	5623	5635	5647	5658	5670	1	2	4	5	6	7	8	10	11
37	5682	5694	5705	5717	5729	5740	5752	5763	5775	5786	1	2	3	5	6	7	8	9	10
38	5798	5809	5821	5832	5843	5855	5866	5877	5888	5899	1	2	3	5	6	7	8	9	10
39	5911	5922	5933	5944	5955	5966	5977	5988	5999	6010	1	2	3	4	5	7	8	9	10
40	6021	6031	6042	6053	6064	6075	6085	6096	6107	6117	1	2	3	4	5	6	8	9	10
41	6128	6138	6149	6160	6170	6180	6191	6201	6212	6222	1	2	3	4	5	6	7	8	9
42	6232	6243	6253	6263	6274	6284	6294	6304	6314	6325	1	2	3	4	5	6	7	8	9
43	6335	6345	6355	6365	6375	6385	6395	6405	6415	6425	1	2	3	4	5	6	7	8	9
44	6435	6444	6454	6464	6474	6484	6493	6503	6513	6522	1	2	3	4	5	6	7	8	9
45	6532	6542	6551	6561	6571	6580	6590	6599	6609	6618	1	2	3	4	5	6	7	8	9
46	6628	6637	6646	6656	6665	6675	6684	6693	6702	6712	1	2	3	4	5	6	7	7	8
47	6721	6730	6739	6749	6758	6767	6776	6785	6794	6803	1	2	3	4	5	6	6	7	8
48	6812	6821	6830	6839	6848	6857	6866	6875	6884	6893	1	2	3	4	4	5	6	7	8
49	6902	6911	6920	6928	6937	6946	6955	6964	6972	6981	1	2	3	4	4	5	6	7	8
50	6990	6998	7007	7016	7024	7033	7042	7050	7059	7067	1	2	3	3	4	5	6	7	8
51	7076	7084	7093	7101	7110	7118	7126	7135	7143	7152	1	2	3	3	4	5	6	7	8
52	7160	7168	7177	7185	7193	7202	7210	7218	7226	7235	1	2	2	3	4	5	6	7	7
53	7243	7251	7259	7267	7275	7284	7292	7300	7308	7316	1	2	2	3	4	5	6	6	7
54	7324	7332	7340	7348	7356	7364	7372	7380	7388	7396	1	2	2	3	4	5	6	6	7

LOGARITHMS

											Mean Differences								
	0	1	2	3	4	5	6	7	8	9									
											1	2	3	4	5	6	7	8	9
55	7404	7412	7419	7427	7435	7443	7451	7459	7466	7474	1	2	2	3	4	5	5	6	7
56	7482	7490	7497	7505	7513	7520	7528	7536	7543	7551	1	2	2	3	4	5	5	6	7
57	7559	7566	7574	7582	7589	7597	7604	7612	7619	7627	1	2	2	3	4	5	5	6	7
58	7634	7642	7649	7657	7664	7672	7679	7686	7694	7701	1	1	2	3	4	4	5	6	7
59	7709	7716	7723	7731	7738	7745	7752	7760	7767	7774	1	1	2	3	4	4	5	6	7
60	7782	7789	7796	7803	7810	7818	7825	7832	7839	7846	1	1	2	3	4	4	5	6	6
61	7853	7860	7868	7875	7882	7889	7896	7903	7910	7917	1	1	2	3	4	4	5	6	6
62	7924	7931	7938	7945	7952	7959	7966	7973	7980	7987	1	1	2	3	3	4	5	6	6
63	7993	8000	8007	8014	8021	8028	8035	8041	8048	8055	1	1	2	3	3	4	5	5	6
64	8062	8069	8075	8082	8089	8096	8102	8109	8116	8122	1	1	2	3	3	4	5	5	6
65	8129	8136	8142	8149	8156	8162	8169	8176	8182	8189	1	1	2	3	3	4	5	5	6
66	8195	8202	8209	8215	8222	8228	8235	8241	8248	8254	1	1	2	3	3	4	5	5	6
67	8261	8267	8274	8280	8287	8293	8299	8306	8312	8319	1	1	2	3	3	4	5	5	6
68	8325	8331	8338	8344	8351	8357	8363	8370	8376	8382	1	1	2	3	3	4	4	5	6
69	8388	8395	8401	8407	8414	8420	8426	8432	8439	8445	1	1	2	2	3	4	4	5	6
70	8451	8457	8463	8470	8476	8482	8488	8494	8500	8506	1	1	2	2	3	4	4	5	6
71	8513	8519	8525	8531	8537	8543	8549	8555	8561	8567	1	1	2	2	3	4	4	5	5
72	8573	8579	8585	8591	8597	8603	8609	8615	8621	8627	1	1	2	2	3	4	4	5	5
73	8633	8639	8645	8651	8657	8663	8669	8675	8681	8686	1	1	2	2	3	4	4	5	5
74	8692	8698	8704	8710	8716	8722	8727	8733	8739	8745	1	1	2	2	3	4	4	5	5
75	8751	8756	8762	8768	8774	8779	8785	8791	8797	8802	1	1	2	2	3	3	4	5	5
76	8808	8814	8820	8825	8831	8837	8842	8848	8854	8859	1	1	2	2	3	3	4	5	5
77	8865	8871	8876	8882	8887	8893	8899	8904	8910	8915	1	1	2	2	3	3	4	5	5
78	8921	8927	8932	8938	8943	8949	8954	8960	8965	8971	1	1	2	2	3	3	4	4	5
79	8976	8982	8987	8993	8998	9004	9009	9015	9020	9025	1	1	2	2	3	3	4	4	5
80	9031	9036	9042	9047	9053	9058	9063	9069	9074	9079	1	1	2	2	3	3	4	4	5
81	9085	9090	9096	9101	9106	9112	9117	9122	9128	9133	1	1	2	2	3	3	4	4	5
82	9138	9143	9149	9154	9159	9165	9170	9175	9180	9186	1	1	2	2	3	3	4	4	5
83	9191	9196	9201	9206	9212	9217	9222	9227	9232	9238	1	1	2	2	3	3	4	4	5
84	9243	9248	9253	9258	9263	9269	9274	9279	9284	9289	1	1	2	2	3	3	4	4	5
85	9294	9299	9304	9309	9315	9320	9325	9330	9335	9340	1	1	2	2	3	3	4	4	5
86	9345	9350	9355	9360	9365	9370	9375	9380	9385	9390	1	1	2	2	3	3	4	4	5
87	9395	9400	9405	9410	9415	9420	9425	9430	9435	9440	0	1	1	2	2	3	3	4	4
88	9445	9450	9455	9460	9465	9469	9474	9479	9484	9489	0	1	1	2	2	3	3	4	4
89	9494	9499	9504	9509	9513	9518	9523	9528	9533	9538	0	1	1	2	2	3	3	4	4
90	9542	9547	9552	9557	9562	9566	9571	9576	9581	9586	0	1	1	2	2	3	3	4	4
91	9590	9595	9600	9605	9609	9614	9619	9624	9628	9633	0	1	1	2	2	3	3	4	4
92	9638	9643	9647	9652	9657	9661	9666	9671	9675	9680	0	1	1	2	2	3	3	4	4
93	9685	9689	9694	9699	9703	9708	9713	9717	9722	9727	0	1	1	2	2	3	3	4	4
94	9731	9736	9741	9745	9750	9754	9759	9763	9768	9773	0	1	1	2	2	3	3	4	4
95	9777	9782	9786	9791	9795	9800	9805	9809	9814	9818	0	1	1	2	2	3	3	4	4
96	9823	9827	9832	9836	9841	9845	9850	9854	9859	9863	0	1	1	2	2	3	3	4	4
97	9868	9872	9877	9881	9886	9890	9894	9899	9903	9908	0	1	1	2	2	3	3	4	4
98	9912	9917	9921	9926	9930	9934	9939	9943	9948	9952	0	1	1	2	2	3	3	4	4
99	9956	9961	9965	9969	9974	9978	9983	9987	9991	9996	0	1	1	2	2	3	3	4	4

ANTILOGARITHMS

	0	1	2	3	4	5	6	7	8	9	Mean Differences								
											1	2	3	4	5	6	7	8	9
-00	1000	1002	1005	1007	1009	1012	1014	1016	1019	1021	0	0	1	1	1	1	2	2	2
-01	1023	1026	1028	1030	1033	1035	1038	1040	1042	1045	0	0	1	1	1	1	2	2	2
-02	1047	1050	1052	1054	1057	1059	1062	1064	1067	1069	0	0	1	1	1	1	2	2	2
-03	1072	1074	1076	1079	1081	1084	1086	1089	1091	1094	0	0	1	1	1	1	2	2	2
-04	1096	1099	1102	1104	1107	1109	1112	1114	1117	1119	0	1	1	1	1	2	2	2	2
-05	1122	1125	1127	1130	1132	1135	1138	1140	1143	1146	0	1	1	1	1	2	2	2	2
-06	1148	1151	1153	1156	1159	1161	1164	1167	1169	1172	0	1	1	1	1	2	2	2	2
-07	1175	1178	1180	1183	1186	1189	1191	1194	1197	1199	0	1	1	1	1	2	2	2	2
-08	1202	1205	1208	1211	1213	1216	1219	1222	1225	1227	0	1	1	1	1	2	2	2	3
-09	1230	1233	1236	1239	1242	1245	1247	1250	1253	1256	0	1	1	1	1	2	2	2	3
-10	1259	1262	1265	1268	1271	1274	1276	1279	1282	1285	0	1	1	1	1	2	2	2	3
-11	1288	1291	1294	1297	1300	1303	1306	1309	1312	1315	0	1	1	1	2	2	2	2	3
-12	1318	1321	1324	1327	1330	1334	1337	1340	1343	1346	0	1	1	1	2	2	2	2	3
-13	1349	1352	1355	1358	1361	1365	1368	1371	1374	1377	0	1	1	1	2	2	2	3	3
-14	1380	1384	1387	1390	1393	1396	1400	1403	1406	1409	0	1	1	1	2	2	2	3	3
-15	1413	1416	1419	1422	1426	1429	1432	1435	1439	1442	0	1	1	1	2	2	2	3	3
-16	1445	1449	1452	1455	1459	1462	1466	1469	1472	1476	0	1	1	1	2	2	2	3	3
-17	1479	1483	1486	1489	1493	1496	1500	1503	1507	1510	0	1	1	1	2	2	2	3	3
-18	1514	1517	1521	1524	1528	1531	1535	1538	1542	1545	0	1	1	1	2	2	2	3	3
-19	1549	1552	1556	1560	1563	1567	1570	1574	1578	1581	0	1	1	1	2	2	2	3	3
-20	1585	1589	1592	1596	1600	1603	1607	1611	1614	1618	0	1	1	1	2	2	2	3	3
-21	1622	1626	1629	1633	1637	1641	1644	1648	1652	1656	0	1	1	1	2	2	2	3	3
-22	1660	1663	1667	1671	1675	1679	1683	1687	1690	1694	0	1	1	1	2	2	2	3	3
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-25	1778	1782	1786	1791	1795	1799	1803	1807	1811	1816	0	1	1	1	2	2	2	3	4
-26	1820	1824	1828	1832	1837	1841	1845	1849	1854	1858	0	1	1	1	2	2	2	3	4
-27	1862	1866	1871	1875	1879	1884	1888	1892	1897	1901	0	1	1	1	2	2	2	3	4
-28	1905	1910	1914	1919	1923	1928	1932	1936	1941	1945	0	1	1	1	2	2	2	3	4
-29	1950	1954	1959	1963	1968	1972	1977	1982	1986	1991	0	1	1	1	2	2	2	3	4
-30	1995	2000	2004	2009	2014	2018	2023	2028	2032	2037	0	1	1	1	2	2	2	3	4
-31	2042	2046	2051	2056	2061	2065	2070	2075	2080	2084	0	1	1	1	2	2	2	3	4
-32	2089	2094	2099	2104	2109	2113	2118	2123	2128	2133	0	1	1	1	2	2	2	3	4
-33	2138	2143	2148	2153	2158	2163	2168	2173	2178	2183	0	1	1	1	2	2	2	3	4
-34	2188	2193	2198	2203	2208	2213	2218	2223	2228	2234	1	1	1	1	2	2	2	3	4
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-36	2291	2296	2301	2307	2312	2317	2323	2328	2333	2339	1	1	1	1	2	2	2	3	4
-37	2344	2350	2355	2360	2366	2371	2377	2382	2388	2393	1	1	1	1	2	2	2	3	4
-38	2399	2404	2410	2415	2421	2427	2432	2438	2443	2449	1	1	1	1	2	2	2	3	4
-39	2455	2460	2466	2472	2477	2483	2489	2495	2500	2506	1	1	1	1	2	2	2	3	4
-40	2512	2518	2523	2529	2535	2541	2547	2553	2559	2564	1	1	1	1	2	2	2	3	4
-41	2570	2576	2582	2588	2594	2600	2606	2612	2618	2624	1	1	1	1	2	2	2	3	4
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-44	2754	2761	2767	2773	2780	2786	2793	2799	2805	2812	1	1	1	1	2	2	2	3	4
-45	2818	2825	2831	2838	2844	2851	2858	2864	2871	2877	1	1	1	1	2	2	2	3	4
-46	2884	2891	2897	2904	2911	2917	2924	2931	2938	2944	1	1	1	1	2	2	2	3	4
-47	2951	2958	2965	2972	2979	2985	2992	2999	3006	3013	1	1	1	1	2	2	2	3	4
-48	3020	3027	3034	3041	3048	3055	3062	3069	3076	3083	1	1	1	1	2	2	2	3	4
-49	3090	3097	3105	3112	3119	3126	3133	3141	3148	3155	1	1	1	1	2	2	2	3	4

ANTILOGARITHMS

											Mean Differences								
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	-50	3162	3170	3177	3184	3192	3199	3206	3214	3221	3228	1	1	2	3	4	4	5	6
-51	3236	3243	3251	3258	3266	3273	3281	3289	3296	3304	1	2	2	3	4	5	5	6	7
-52	3311	3319	3327	3334	3342	3350	3357	3365	3373	3381	1	2	2	3	4	5	5	6	7
-53	3388	3396	3404	3412	3420	3428	3436	3444	3451	3459	1	2	2	3	4	5	6	6	7
-54	3467	3475	3483	3491	3499	3508	3516	3524	3532	3540	1	2	2	3	4	5	6	6	7
-55	3548	3556	3565	3573	3581	3589	3597	3606	3614	3622	1	2	2	3	4	5	6	6	7
-56	3631	3639	3648	3656	3664	3673	3681	3690	3698	3707	1	2	3	3	4	5	6	7	8
-57	3715	3724	3733	3741	3750	3758	3767	3776	3784	3793	1	2	3	3	4	5	6	7	8
-58	3802	3811	3819	3828	3837	3846	3855	3864	3873	3882	1	2	3	4	5	6	6	7	8
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-60	3981	3990	3999	4009	4018	4027	4036	4046	4055	4064	1	2	3	4	5	6	6	7	8
-61	4074	4083	4093	4102	4111	4121	4130	4140	4150	4159	1	2	3	4	5	6	7	8	9
-62	4169	4178	4188	4198	4207	4217	4227	4236	4246	4256	1	2	3	4	5	6	7	8	9
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-72	5248	5260	5272	5284	5297	5309	5321	5333	5346	5358	1	2	4	5	6	7	9	10	11
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-74	5495	5508	5521	5534	5546	5559	5572	5585	5598	5610	1	3	4	5	6	8	9	10	12
-75	5623	5636	5649	5662	5675	5689	5702	5715	5728	5741	1	3	4	5	7	8	9	10	12
-76	5754	5768	5781	5794	5808	5821	5834	5848	5861	5875	1	3	4	5	7	8	9	11	12
-77	5888	5902	5916	5929	5943	5957	5970	5984	5998	6012	1	3	4	5	7	8	10	11	12
-78	6026	6039	6053	6067	6081	6095	6109	6124	6138	6152	1	3	4	6	7	8	10	11	13
-79	6166	6180	6194	6209	6223	6237	6252	6266	6281	6295	1	3	4	6	7	9	10	11	13
-80	6310	6324	6339	6353	6368	6383	6397	6412	6427	6442	1	3	4	6	7	9	10	12	13
-81	6457	6471	6486	6501	6516	6531	6546	6561	6577	6592	2	3	5	6	8	9	11	12	14
-82	6607	6622	6637	6653	6668	6683	6699	6714	6730	6745	2	3	5	6	8	9	11	12	14
-83	6761	6776	6792	6808	6823	6839	6855	6871	6887	6902	2	3	5	6	8	9	11	13	14
-84	6913	6934	6950	6966	6982	6998	7015	7031	7047	7063	2	3	5	6	8	10	11	13	15
-85	7079	7096	7112	7129	7145	7161	7178	7194	7211	7228	2	3	5	7	8	10	12	13	15
-86	7244	7261	7278	7295	7311	7328	7345	7362	7379	7396	2	3	5	7	8	10	12	13	15
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-91	8128	8147	8166	8185	8204	8222	8241	8260	8279	8299	2	4	6	8	9	11	13	15	17
-92	8318	8337	8356	8375	8395	8414	8433	8453	8472	8492	2	4	6	8	10	12	14	15	17
-93	8511	8531	8551	8570	8590	8610	8630	8650	8670	8690	2	4	6	8	10	12	14	16	18
-94	8710	8730	8750	8770	8790	8810	8831	8851	8872	8892	2	4	6	8	10	12	14	16	18
-95	8913	8933	8954	8974	8995	9016	9036	9057	9078	9099	2	4	6	8	10	12	15	17	19
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-98	9550	9572	9594	9616	9638	9661	9683	9705	9727	9750	2	4	7	9	11	13	16	18	20
-99	9772	9795	9817	9840	9863	9886	9908	9931	9954	9977	2	5	7	9	11	14	16	18	20

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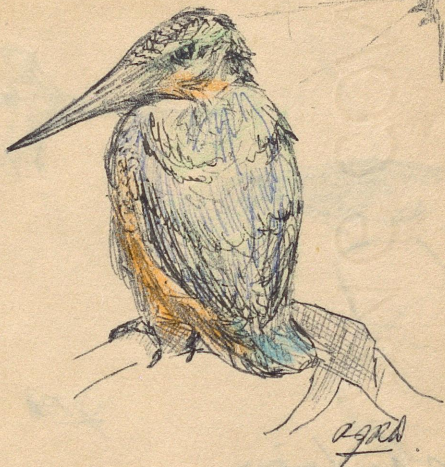
Prof. C. K. RAJAGOPAL

K. K. Mathan

Secretary.

January 1 Tuesday

மார்ச்சு 17 செவ்வாய்



29/1/80

Common Kingfisher

1980

January 2 Wednesday

மார்ச்சு 18 புதன்

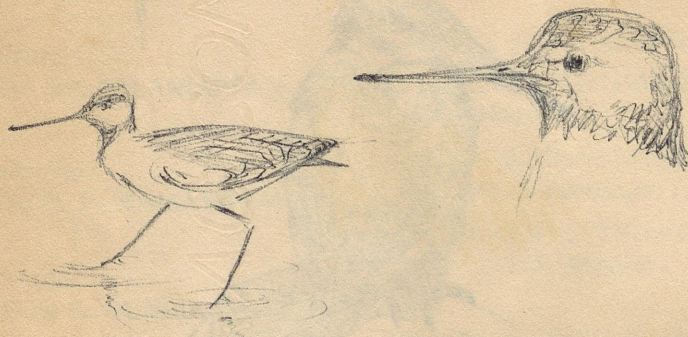


29/1/80

Purple-rumped
Sunbird

January 3 Thursday

மார்ச்சு 19 வியாழன்



sandpiper

RPR

1980

January 4 Friday

மார்ச்சு 20 வெள்ளி



RPR

spotted owl.

ரழன்

January 5 Saturday

மர்கழி 21 சனி

யார்.

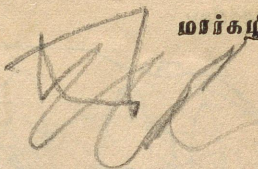


1980

ள்ளி

January 6 Sunday

மர்கழி 22 சூயிற



யார்.



Red

Red whiskered Bulbul

1980

Polyalthia longifolia

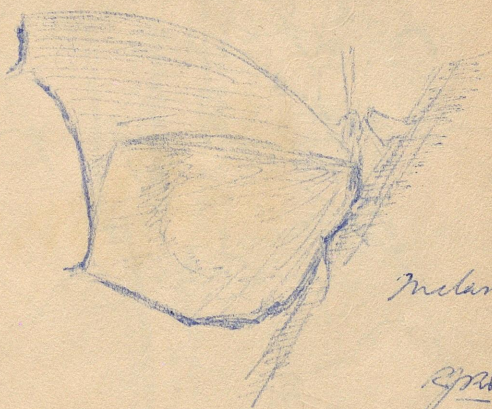


bud

Red

January 9 Wednesday

மார்ச்சு 25 புதன்



Melanitis ismene

Spms.

(Ric)

Nymphalidae
Satyridae

1980

January 10 Thursday

மார்ச்சு 26 வியாழன்



Impatiens
holstei.

Spms.

January 11 Friday

மார்ச்சு 27 வெள்ளி



rnk

Begonia

1980

January 12 Saturday

மார்ச்சு 28 சனி



Begonia.

rnk

ரள்

January 13 Sunday

மார்ச்சு 29 சூயிறு



1980

P.R.S.

சன்

January 14 Monday

மார்ச்சு 30 திங்கள்



P.R.S.

Magpie Robin.

January 15 Tuesday

தை 1 செவ்வாய்

Simitan Babbler.



January 16 Wednesday

தை 2 புதன்

about that of a Babbler - heavier.

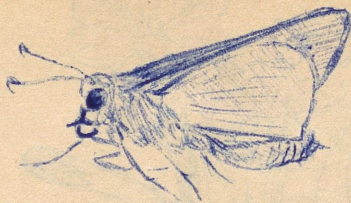
Uniform chocolate brown except white
throat & breast & a streak above the
eye (very conspicuous). Bill heavy & bright yellow.

In small flocks among tea bushes - noisy
(like a babbler) noisy while feeding. Noisy
leg (like babbler) while feeding.

Found eating something like a skink
crushing it & tearing it with bill & legs.
Low flying.

— Velparai.

17.3.80



Paranara

mathias

(Rice)

Hesperiidae.

1980

1980



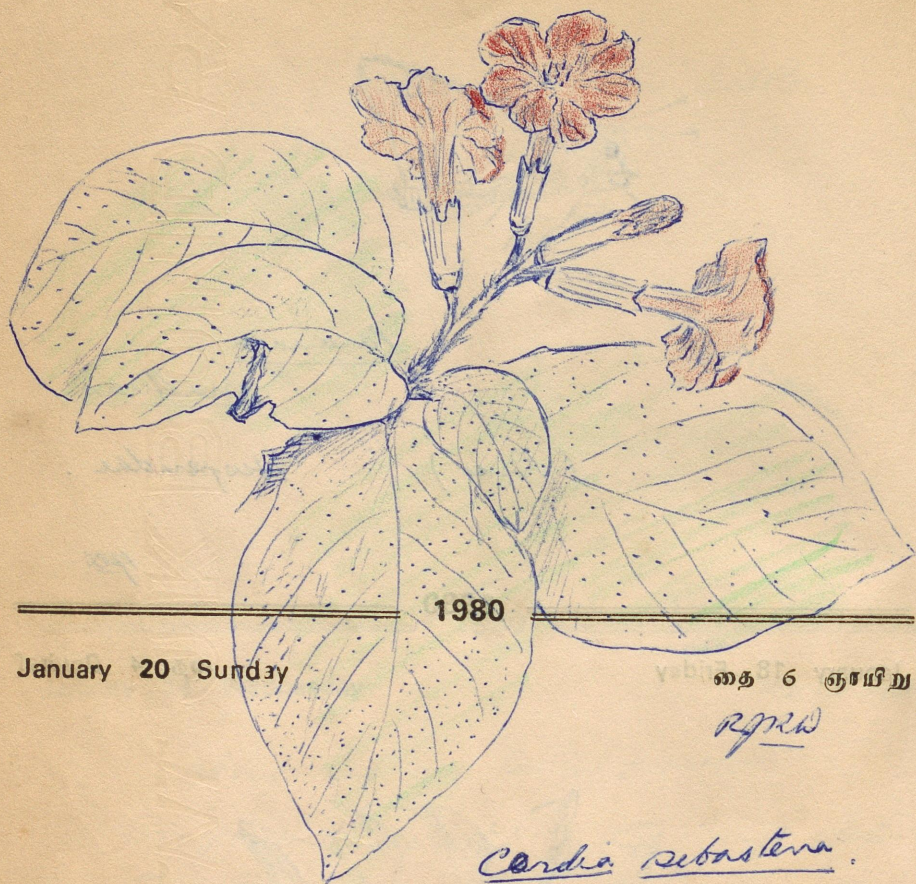
Ipomoea tuberosa

'Wood Rose'
(budd calyx)

1980

January 19 Saturday

தை 5 சனி



January 20 Sunday

தை 6 குரையிறு

ரஜா

Cardia sebastena.

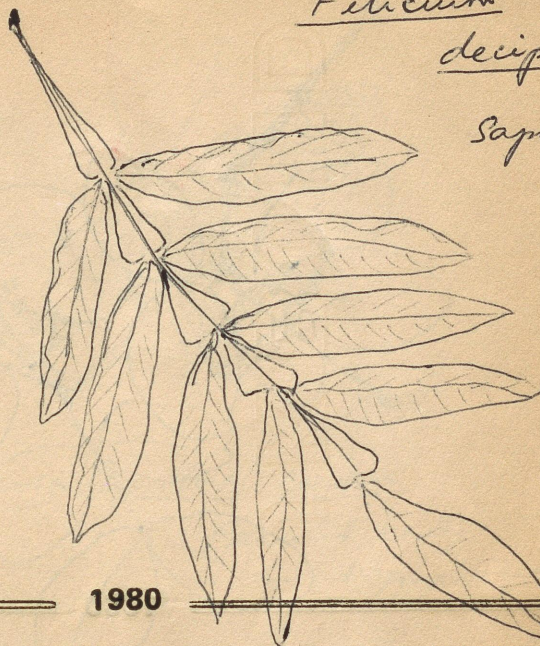
Brilliantly red flowers. 6 stamens
stigma 4 lobes. leaves thick & hairy
peduncle also hairy.

Boaginaeae.

Filicium

decipiens

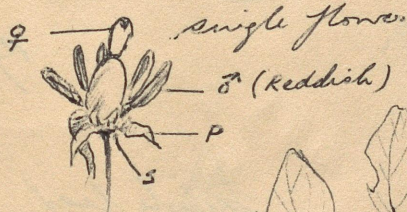
Sapindaceae



Fern-leaf tree

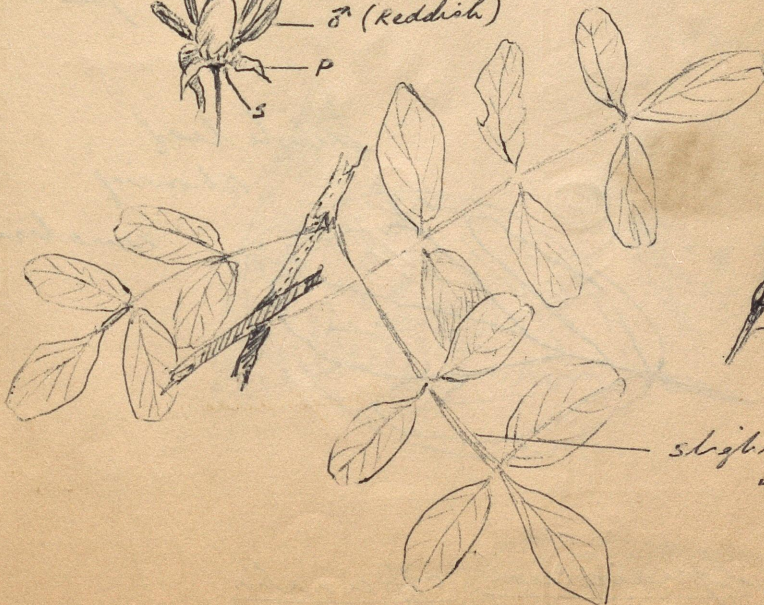
1980

R.P.P.D.



single flower

♂ (reddish)



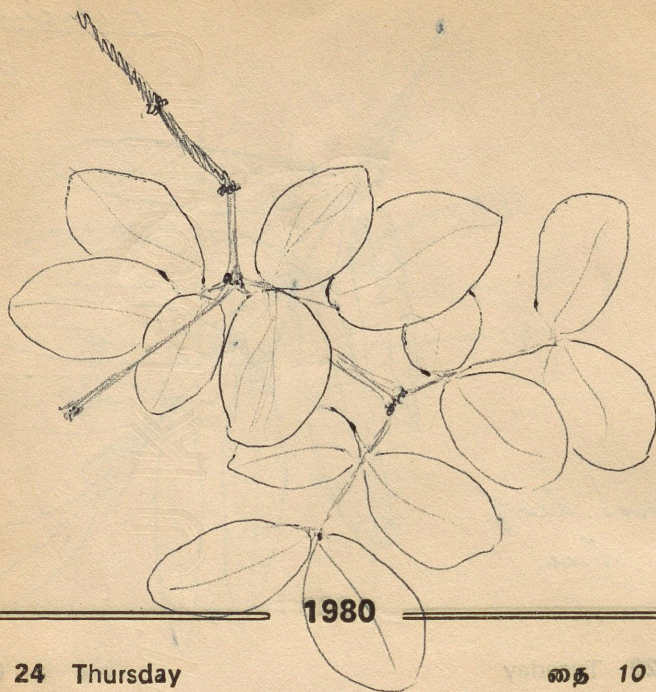
slightly winged

Rutaceae

Wood apple - Feronia elephantum R.P.P.D.

January 23 Wednesday

தை 9 புதன்



1980

January 24 Thursday

தை 10 வியாழன்

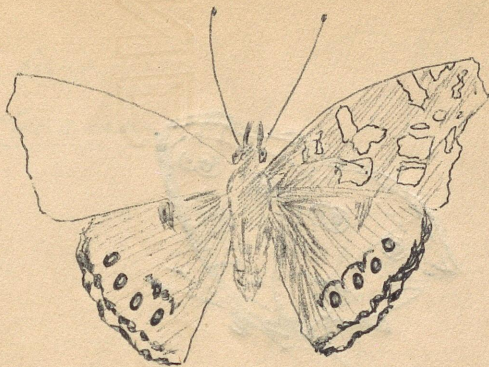
RGRD.

single leaf
showing
venation



Lycium officinale

Zygophyllaceae



RRR

Vanessa / Cynthia cardui

Painted lady

Nymphalidae

1980

Pericottia ricini

Arctidae

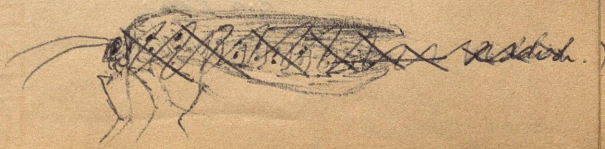


-Brown



Reddish

RRR



January 27 Sunday

தை 13 குடியிறு



1980

January 28 Monday

தை 14 திங்கள்



orange.

Junonia almana
asteriae.

5.5 cm.

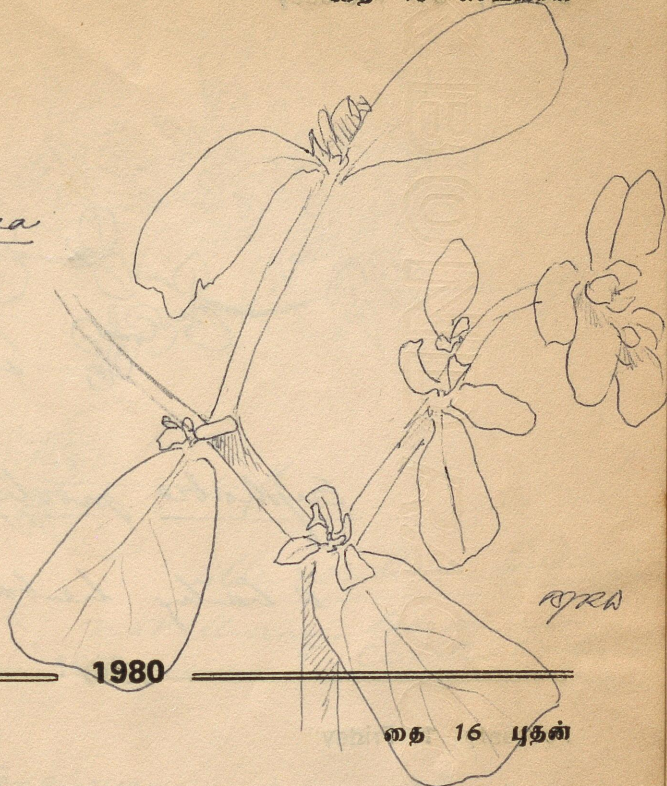
Nymphalidae

சாய்று

January 29 Tuesday

தை 15 செவ்வாய்

Portulaca
oleracea



ARWA

1980

ங்கள்

January 30 Wednesday

தை 16 புதன்



Trailing
herbaceous (leaves succulent)

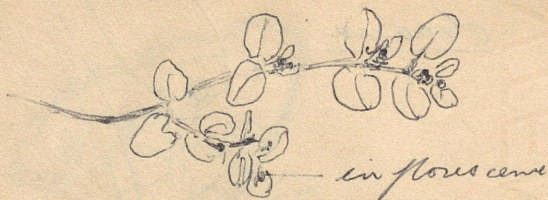
Red + green stems exist.

Portulaca sp
(~~parviflora~~)

na

January 31 Thursday

தை 17 வியாழன்



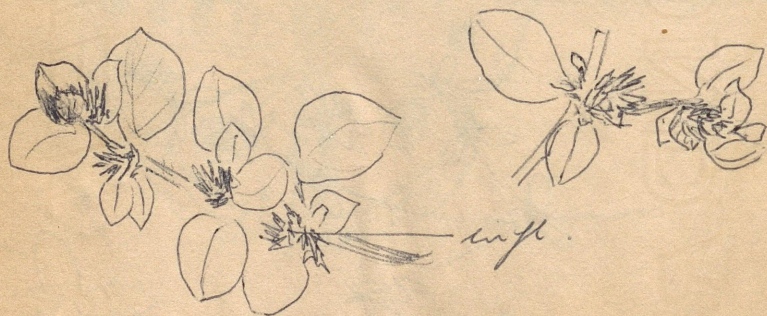
Euphorbia prostrata

a trailing herbaceous weed

1980

February 1 Friday

தை 18 வெள்ளி

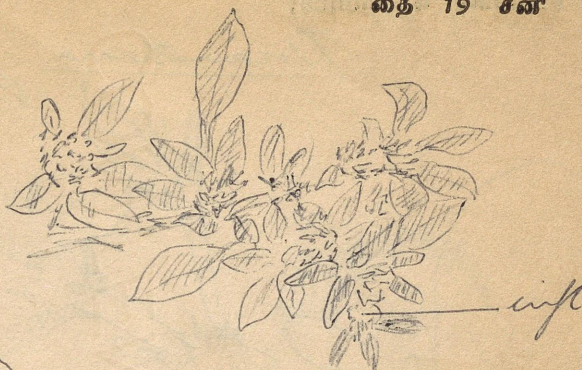


Alternanthera echinata

Greenish axillary inf - prickly - stem hairy
leaves large + round (almost medium)

February 2 Saturday

தை 19 சனி



Althaea rosea trandra
infl white, not thorny, leaves more
clusters + smaller
oval

1980

February 3 Sunday

தை 20 குமீறு

Myrtaceae



Boerhavia diffusa

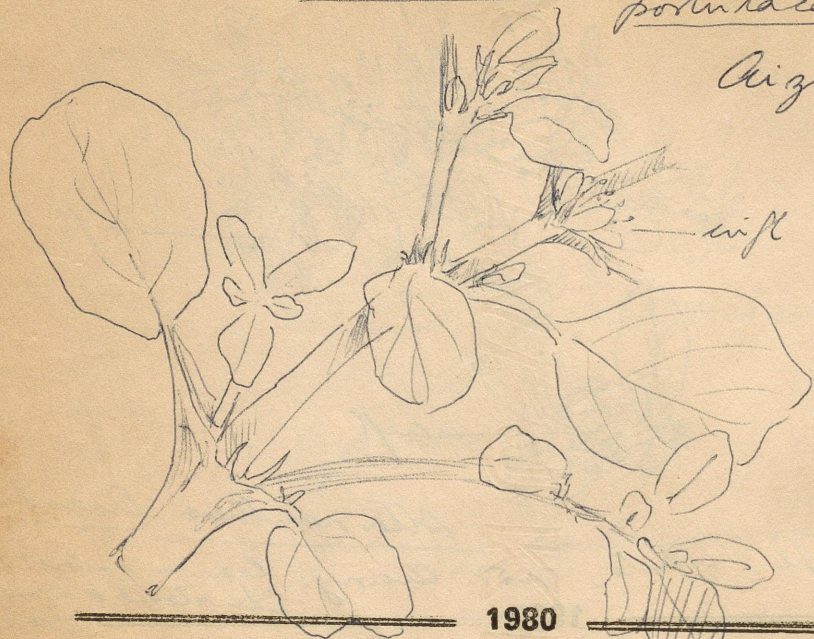
JKR

February 4 Monday

தை 21 திங்கள்

Trianthema portulacastrum

Aizoaceae

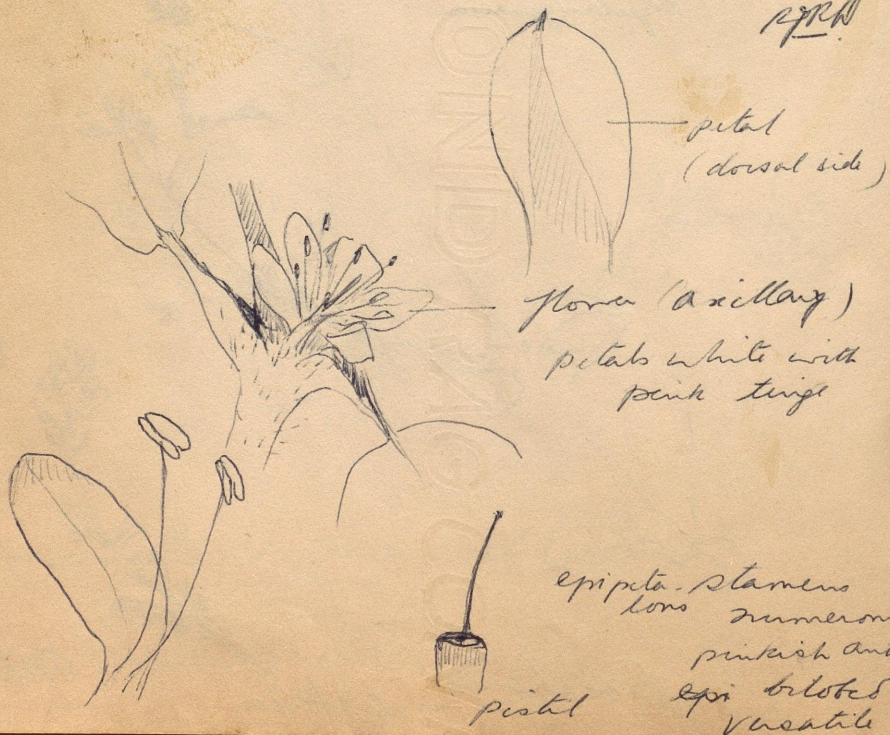


1980

February 5 Tuesday

தை 22 செவ்வாய்

epid.



flora (axillary)
petals white with
pink tinge

epipeta. Stamens
long numerous
pinkish anthers
epi trilobed
vestigial

pistil

தீங்கள்

February 6 Wednesday

சனி 23 புதன்



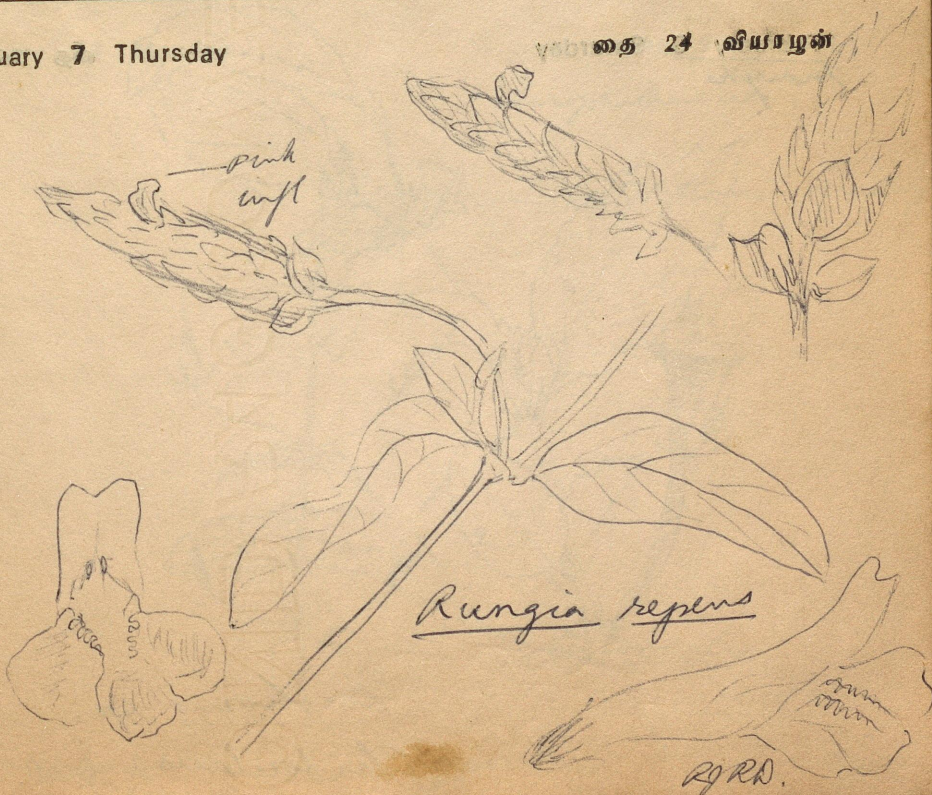
Amaranthus viridis

1980

வரய்

February 7 Thursday

சனி 24 வியாழன்



Rungia repens

R.R.D.

February 8 Friday

தை 25 வெள்ளி



Euphorbia hirta

ரஜா

1980

February 9 Saturday

தை 26 சனி

Meryka



Corchorus sp.
(*titoularis*) ரஜா.

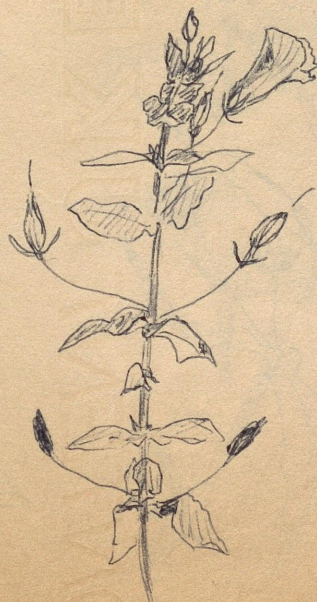


Ammania
baccifera
Lythaceae
RGRD

stem angled, purplish tinge, glabrous, (LH)

1980

Scrophulariaceae.



— violet flower. axillary



Stemodia
viscosa

stem hairy

leaves opposite

RGRD

February 12 Tuesday

தை 29 செவ்வாய்



Phytol / Lippia nodiflora
(Wet lands)
RGRD.
Verbenaceae

1980

February 13 Wednesday

மரதி 1 புதன்

sun



stem dark
hairy,
leaves opposite
infl. head
axillary -
white

Echysta alba

RGRD.

February 14 Thursday

மார்ச் 2 வியாழன்

வாய்



Sida sp.

Borhonia

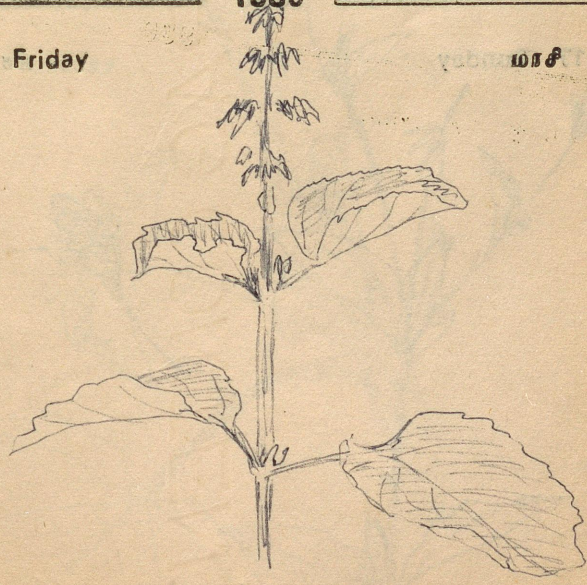
rectangularis ^{APR}

1980

February 15 Friday

மார்ச் 3 வெள்ளி

தன்



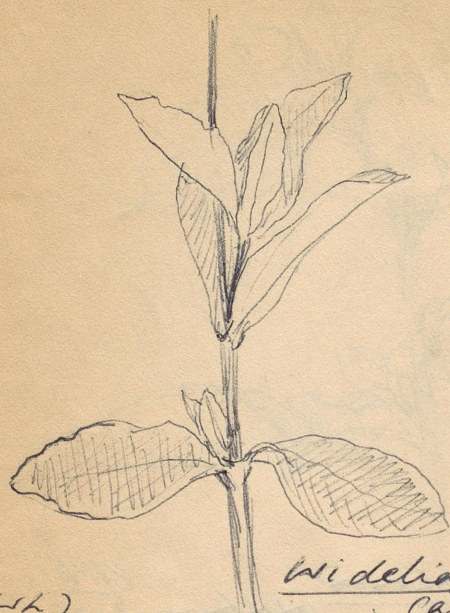
P/RA

Ocimum sp.

Uba

February 16 Saturday

மார்ச் 4 சனி



— yellow
solitary
terminal

long peduncle
leaves opposite
ovate, thick, petiole

(LH)

Widelia
Calandulacea pyrd
1980

February 17 Sunday

மார்ச் 5 சூழ்நிற



— yellow

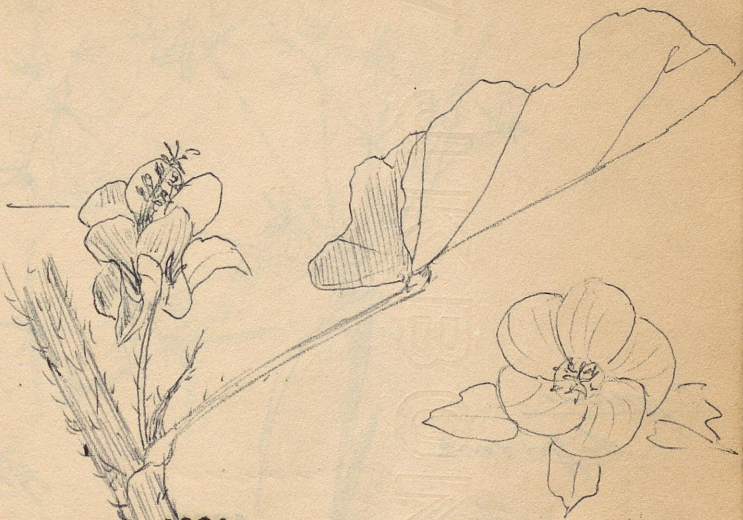
leaves opposite.

pyrd

சனி
February 18 Monday

மாசி 6 திங்கள்

yellow



1980

திரு
February 19 Tuesday

மாசி 7 செவ்வாய்

pink



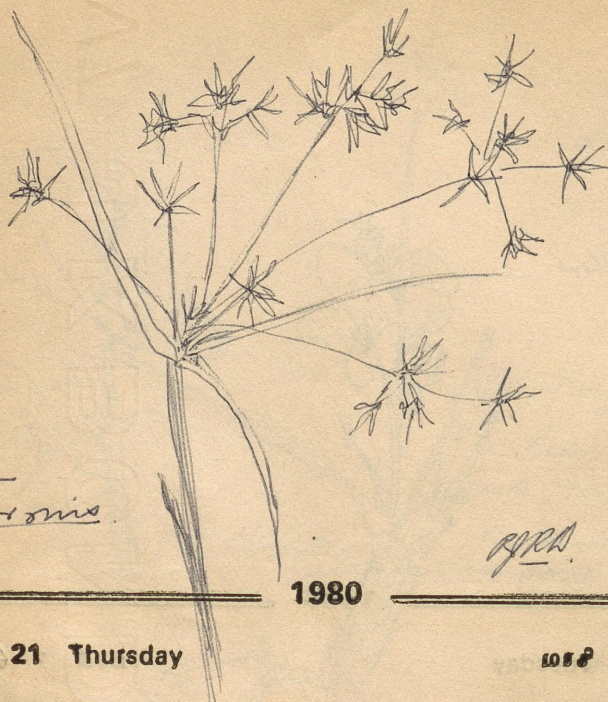
stem
hairy
woody
leaves alternate
ovate + serrate.
flowers axillary
yellow - Typically
maharsons.

SPD.

February 20 Wednesday

மார்ச் 8 புதன்

Johnnie



Cyperus
diffusus

R.P.S.

1980

February 21 Thursday

மார்ச் 9 வியாழன்



Fut
Cyperus

fl. white

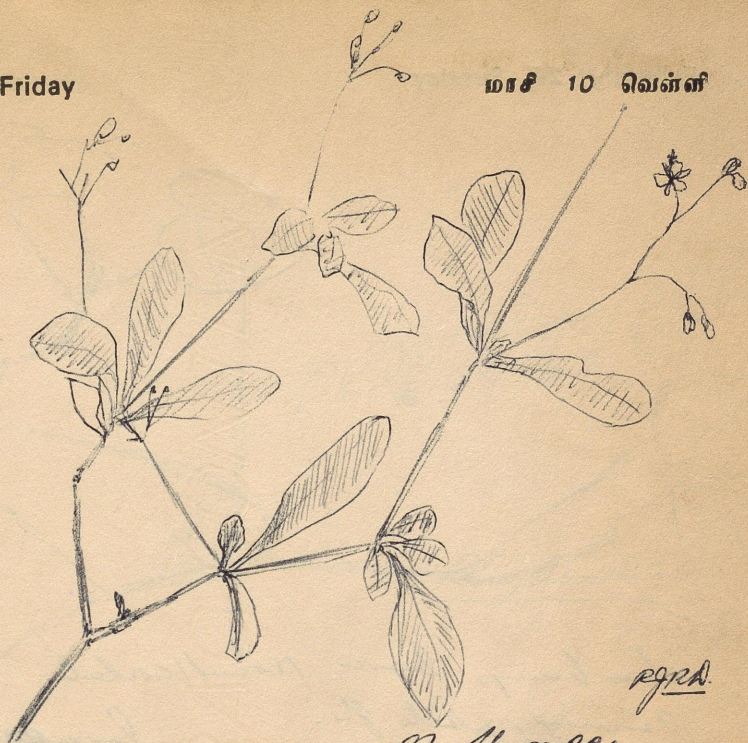
leaves opposite
glabrous
erect herb

(Limnasia parvis)

R.P.S.

February 22 Friday

மார்ச் 10 வெள்ளி



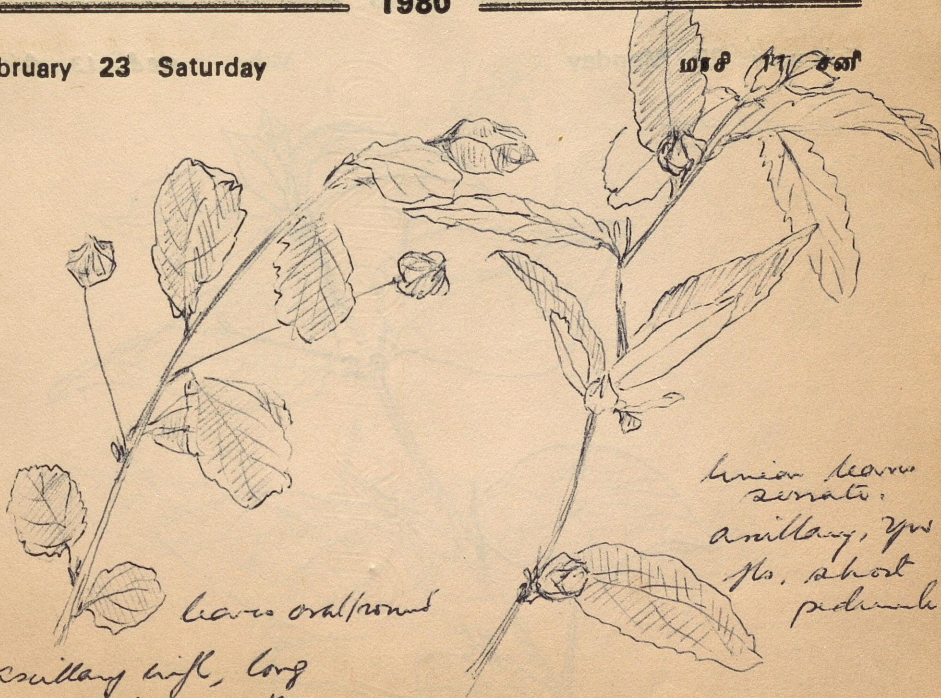
egrs

Mollugo sp.

1980

February 23 Saturday

மார்ச் 11 சனி



linear leaves
seriate.
axillary, yw
fls. short
peduncle

leaves oval/round

axillary inf., long
peduncle. yw fls.

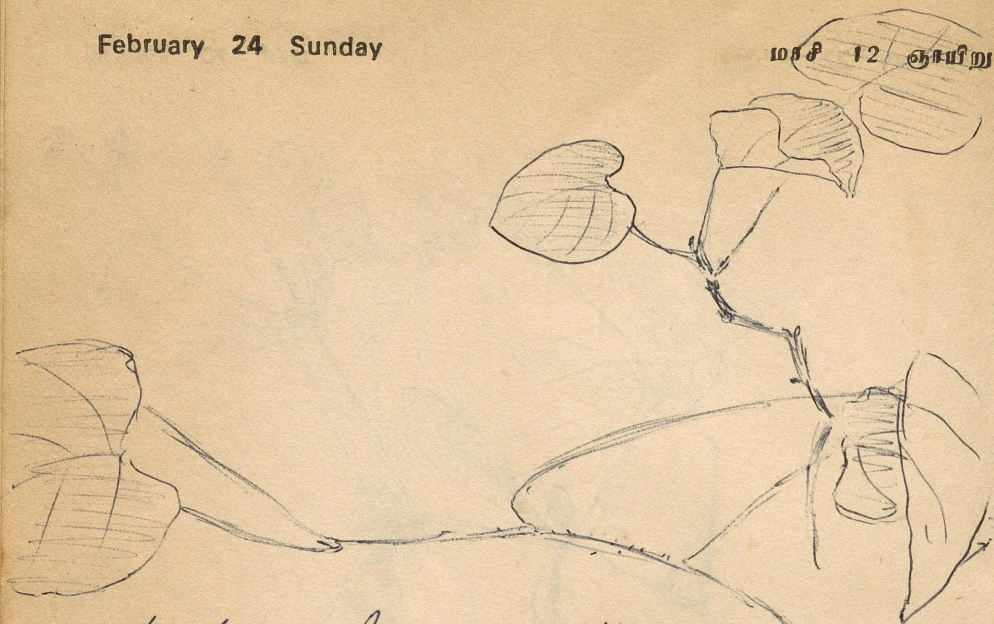
Malvaceae.

Sida sp

egrs

February 24 Sunday

மார்ச் 12 சனிக்கிழமை



stem hairy, base round/cordate
 Trining, white fl.

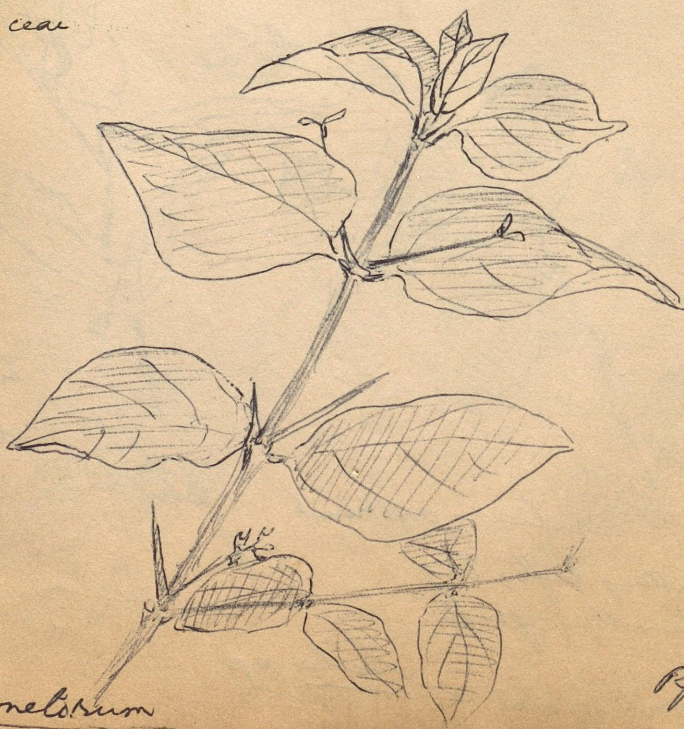
Sponsea sp. *Rydb.*

1980

February 25 Monday

மார்ச் 13 திங்கள்

Rubiacae



Randia
dumetorum

Rydb.

யிறு

February 26 Tuesday

மார்ச் 14 செவ்வாய்



Phyllanthus
nivai

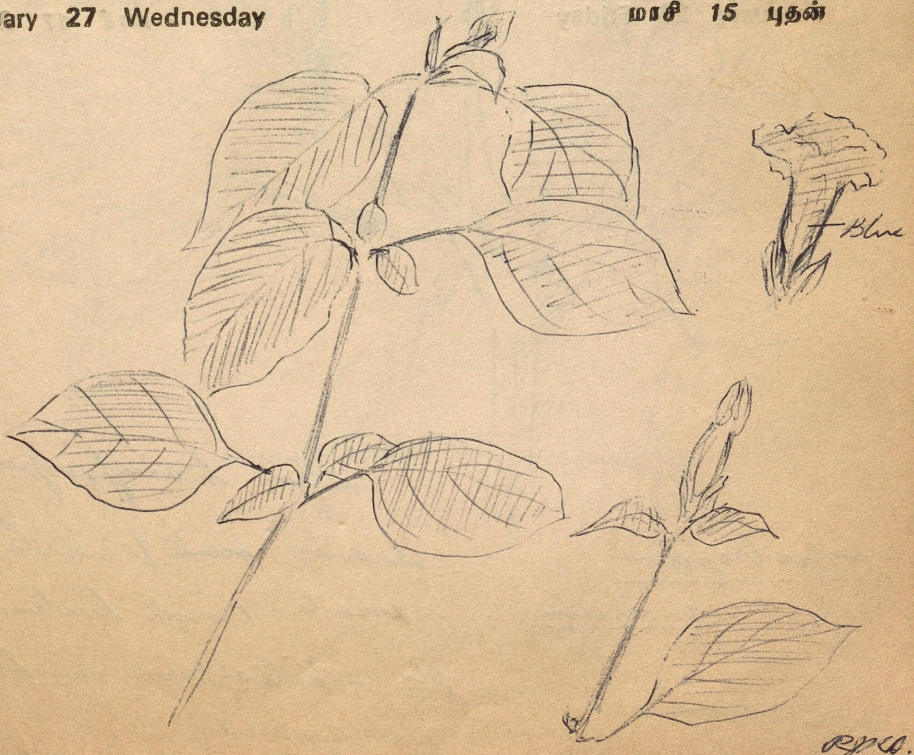
repa.

1980

கள்

February 27 Wednesday

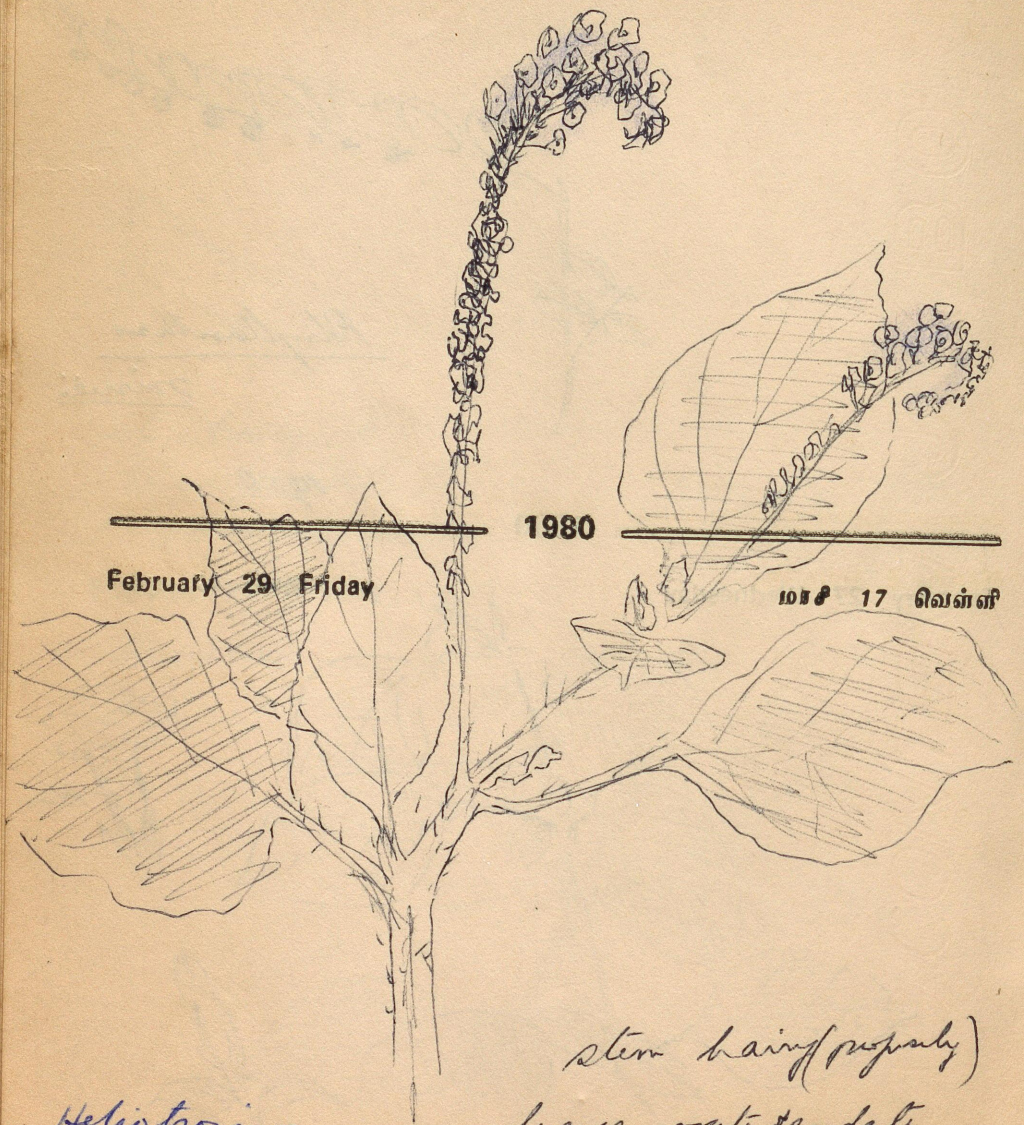
மார்ச் 15 புதன்



repa.

February 28 Thursday

மார்ச் 16 வியாழன்



February 29 Friday

1980

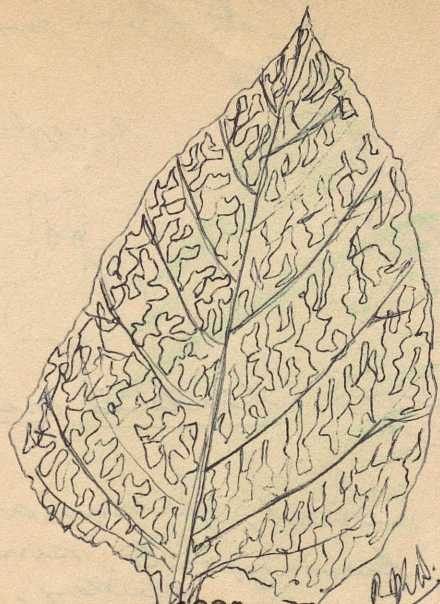
மார்ச் 17 வெள்ளி

Heliotropium
indicum

Boraginaceae.

stem hairy (pubescent)
leaves ovate to cordate,
serrate, rough texture
fls whitish/pink in termi-
nal spikes.

1980



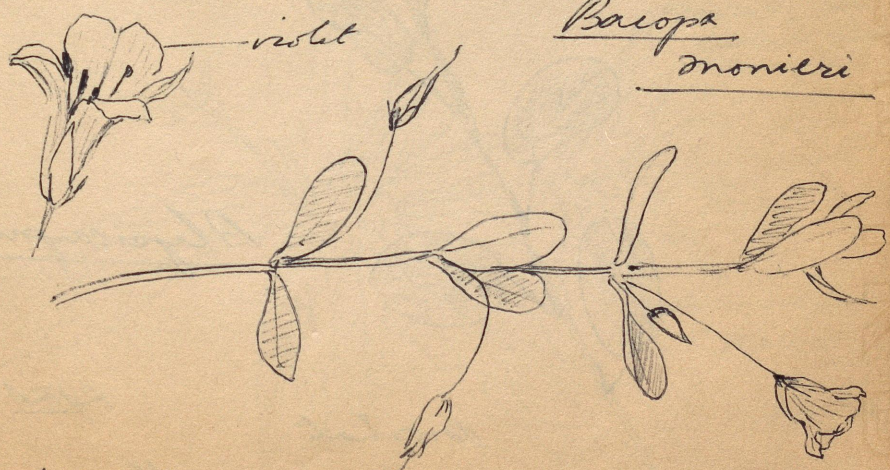
1980

March 2 Sunday

மாசி 19 குாயிறு

Scrophulariaceae

Bacopa monnieri

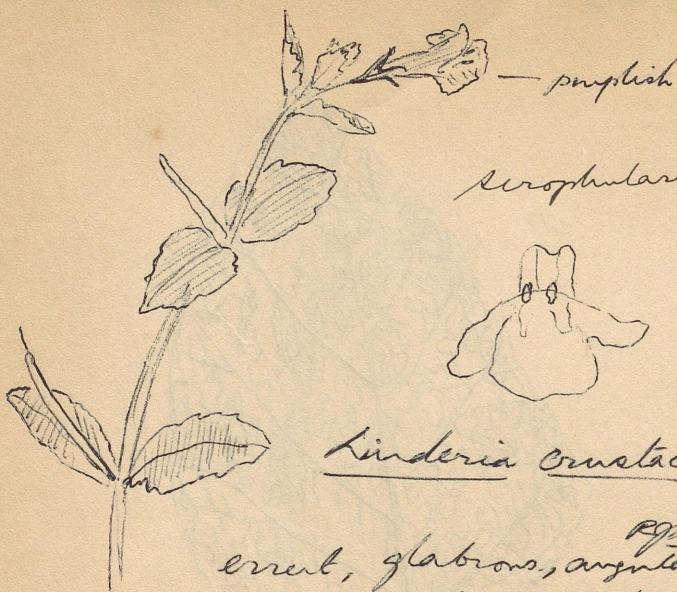


Prostrate, stem pinkish. Yfation
Bristly solitary violet flowers.
leaves succulent, opposite + entire.

sp.A.

March 3 Monday

மார்ச் 20 திங்கள்



Scrophulariaceae

Kunderia crustacea.

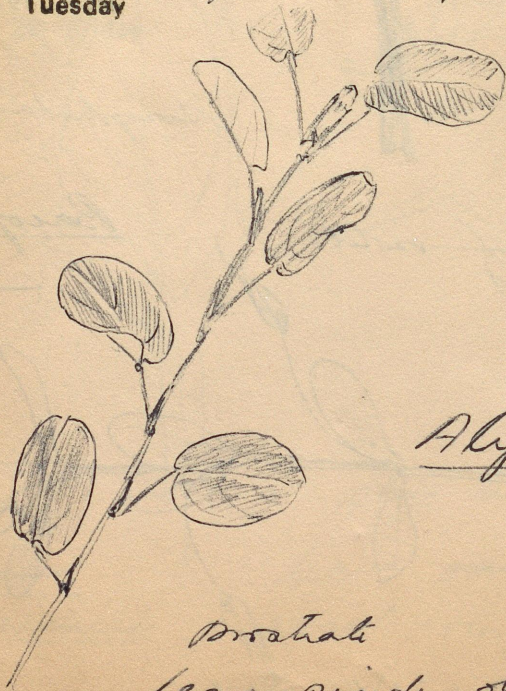
^{Rydb.}
 erect, glabrous, angular stem
 leaves opposite, ovate, flowers
 axillary, solitary.

1980

March 4 Tuesday

purple, long tips 2-lobed, flat capsule

மார்ச் 21 செவ்வாய்



Alysicarpus sp

^{Rydb.}
 prostrate
 leaves simple oblong, alternate.
 Leguminosae.



Acalypha sp.

stem angled
pinkish at the nodes
leaves opposite serrate
-mosaic.

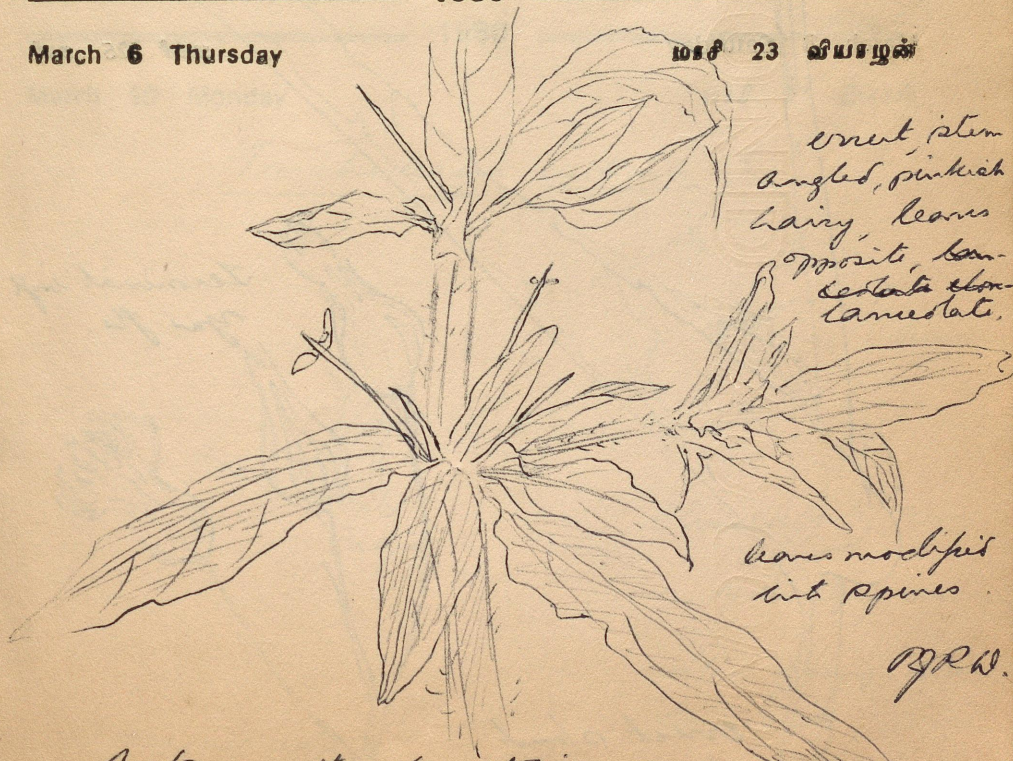
RPW.

1980

sp. n.
வாய்

March 6 Thursday

மார்ச் 23 விவரமூன்



erect, stem
angled, pinkish
hairy, leaves
opposite, lance-
olate, serrate
-lanceolate.

leaves nodding
with spines.

RPW.

Astracantha longifolia

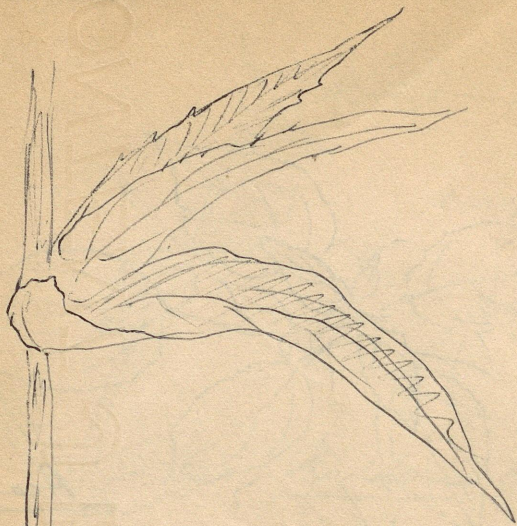
Acanthaceae

terate.

March 7 Friday

மார்ச் 24 வெள்ளி

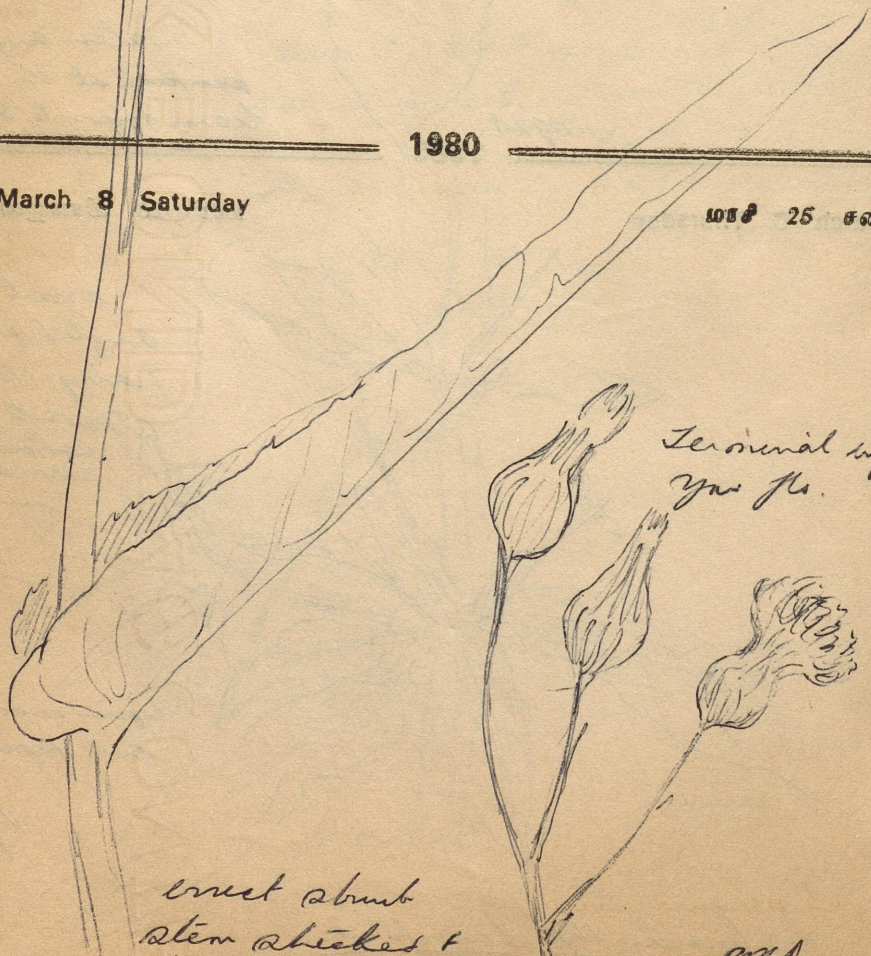
Sonchus sp.



1980

March 8 Saturday

மார்ச் 25 சனி



Terminal inflo.
young fls.

erect shrub
stem thickened &
hairy, leaves lanceolate serrate apex.
- obtusely

March 9 Sunday

மார்ச் 26 குடியிற



1980

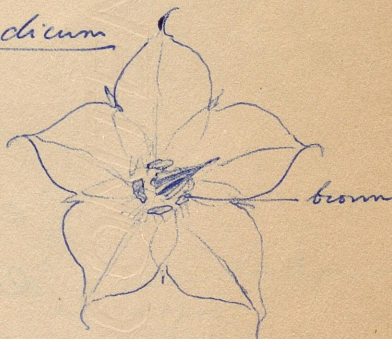
R.P.S.

சனி

March 10 Monday

மார்ச் 27 திங்கள்

Trichodesma indicum



calyx

bluish white flower

solitary, axillary

stem hairy, leaves lanceolate, sessile,

leaves opposite below & alternate above.

Bragmia uae.

March 15 Saturday

மங்குனி 2 சனி



1980

March 16 Sunday

மங்குனி 3 குடியிற

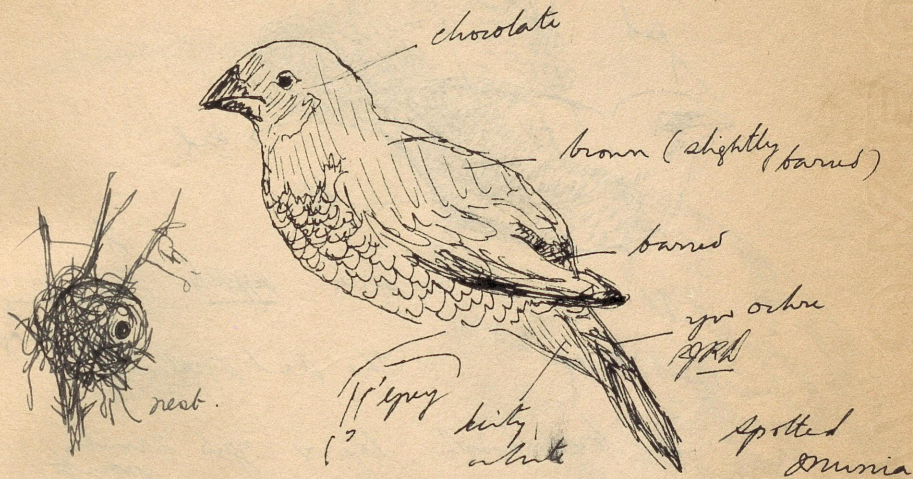


pinkish white

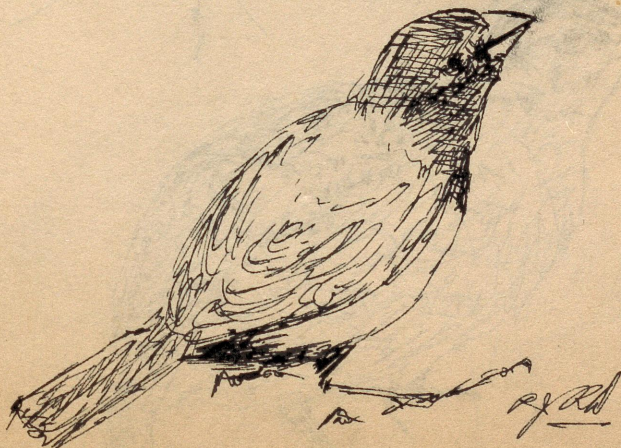
Parsonia zeylonica

Agst.

An erect herb, hairy stem,
leaves lobed / dentate alternate, fls
solitary pinkish white, long peduncle



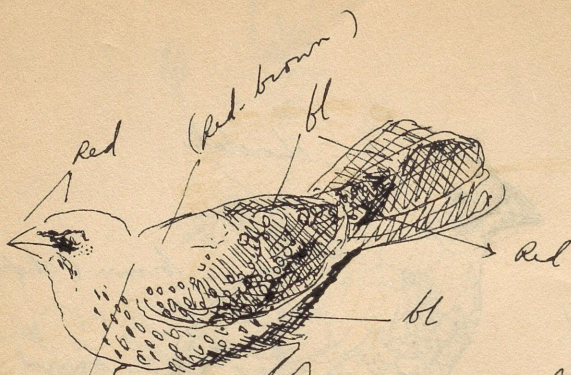
1980



Black headed
Munia

March 23 Sunday

பங்குனி 10 குடியற்று



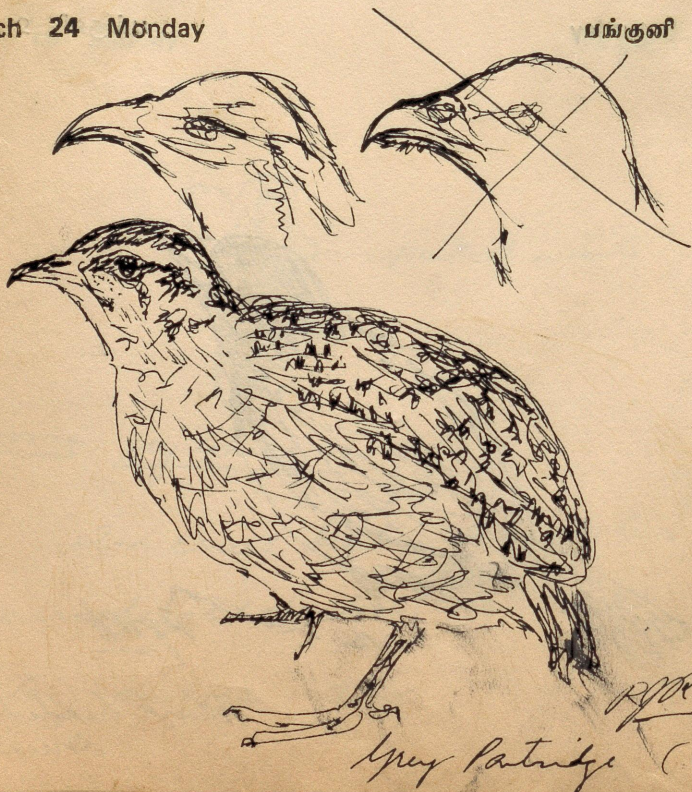
Red (white spots) pink eggs (breeding plumage) ♂
 The Red sunnia

♀ brownish top & yw under parts.

1980

March 24 Monday

பங்குனி 11 திங்கள்



eggs
 Grey Partridge (Strike)

செய்து

March 25 Tuesday

பங்குனி 12 செவ்வாய்



1980

March 26 Wednesday

பங்குனி 13 புதன்

(III mahas)
Hoopoe *[Signature]*

(From the specimen)



March 27 Thursday

பங்குனி 14 விசுழன்

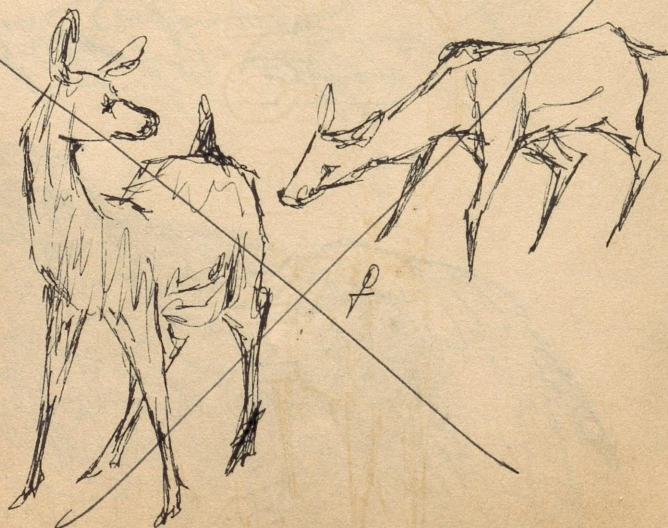


(III madhar) Black buck (♂)

1980

March 28 Friday

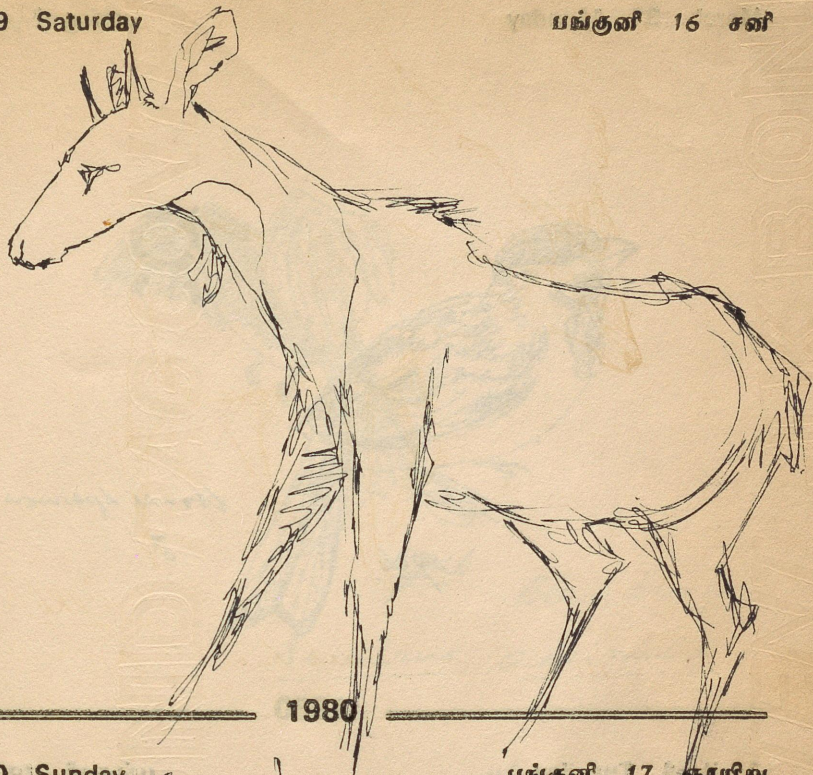
பங்குனி 15 வெள்ளி



பழனி

March 29 Saturday

பங்குனி 16 சனி



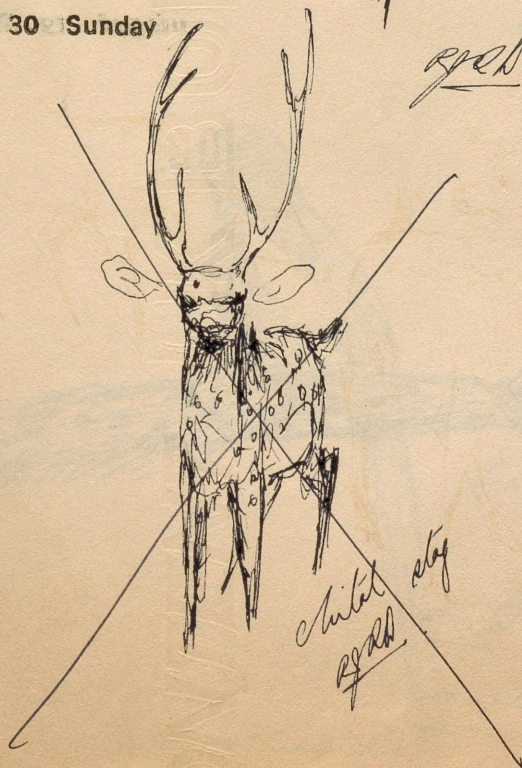
1980

பள்ளி

March 30 Sunday

பங்குனி 17 சூரியறு

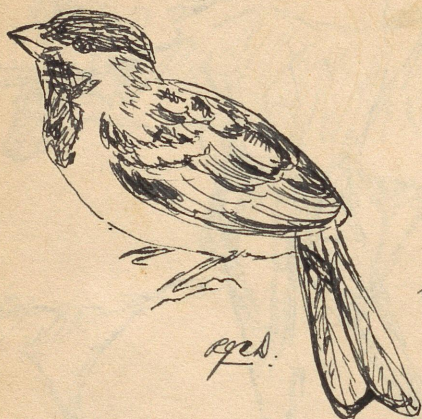
eyes Nilgiri



sketch eyes

March 31 Monday

பங்குனி 18 திங்கள்



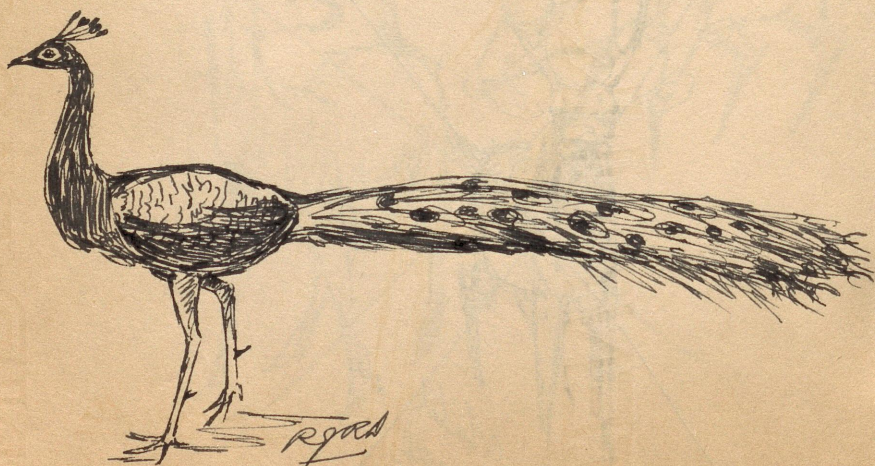
House Sparrow

♂

1980

April 1 Tuesday

பங்குனி 19 செவ்வாய்



Peacock.

Madurai



Ryal Black Group.

Sicurus adimilis

1980



Ryal

The Tree-pie.

Dendrocitta

vagabunda

April 4 Friday

பங்குனி 22 வெள்ளி



eps

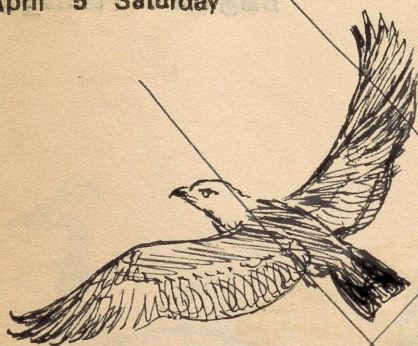
night heron



1980

April 5 Saturday

பங்குனி 23 சனி



eps



Brahminy kite



Black winged kite.
RPR
1980

1980



The Pigeon.

RPR
1980

(VNAU under)

April 8 Tuesday

பங்குனி 26 செவ்வாய்



செவ்வாய்

shikra. ♀

1980

April 9 Wednesday

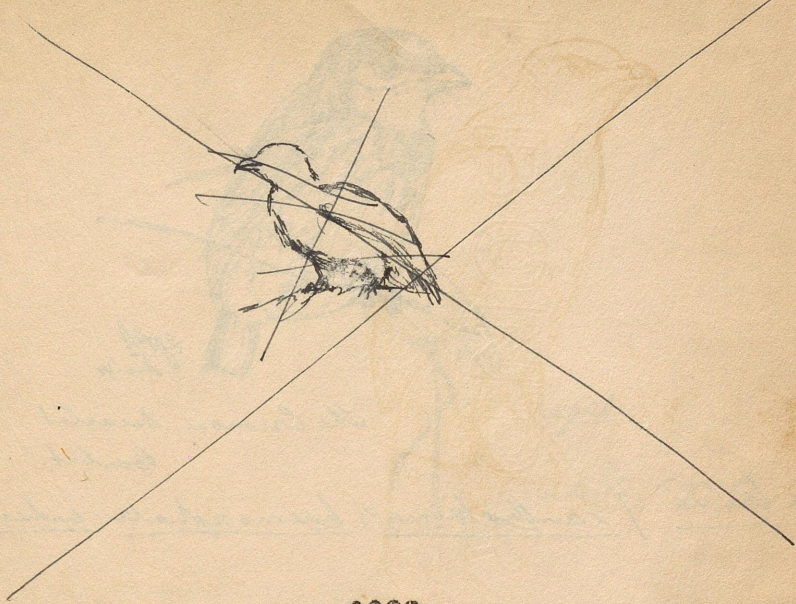
பங்குனி 27 புதன்



grey partridge
செவ்வாய்

April 10 Tuesday

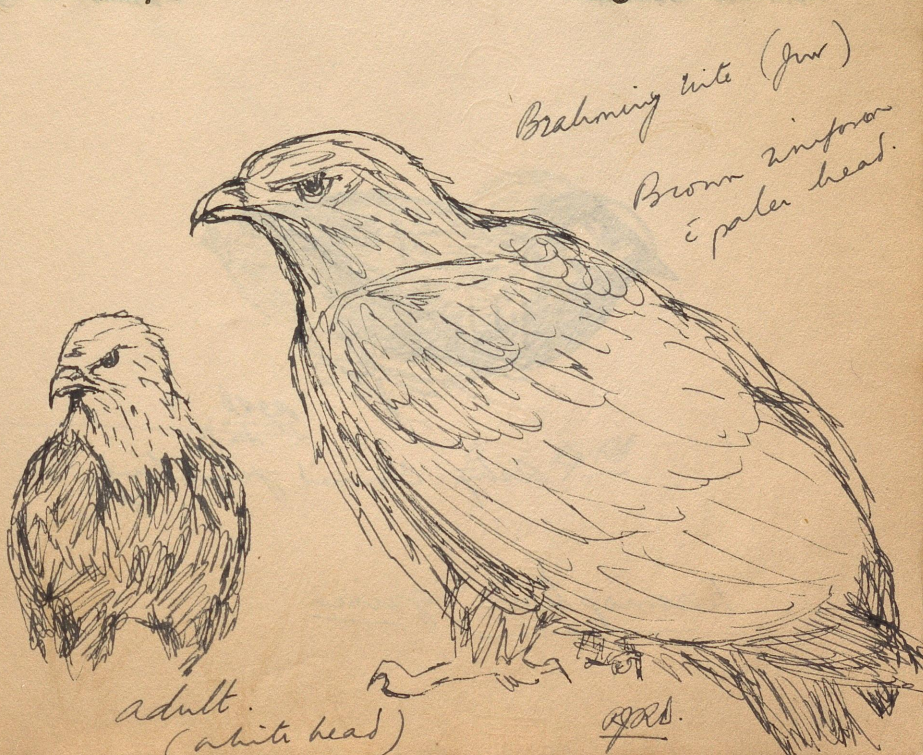
பங்குனி 28 வியாழன்



1980

April 11 Friday

பங்குனி 29 வெள்ளி



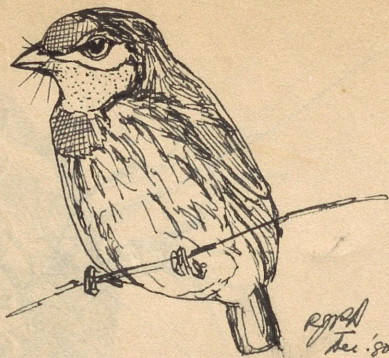
Brahminy kite (juv)
 Brown rufous
 & paler head.

adult
 (white head)

RSB.

April 12 Saturday

பங்குனி 30 சனி



ரயல்
தி. '80

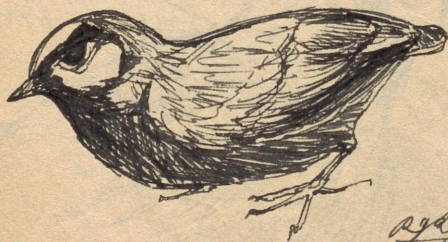
The Crimson breasted
Barbet.

Megalaima / xantholaema haemiocephala indica

1980

April 13 Sunday

ரெளத்திரி
சித்திரை 1 சூரியறு



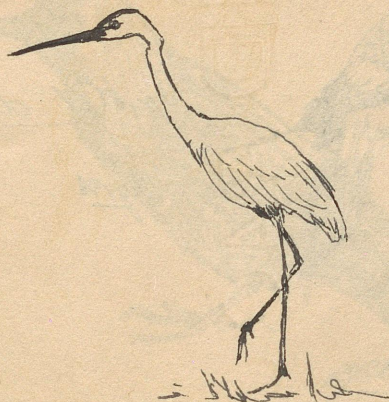
ரயல்
தி. '80

Ashy-crowned Finchlark
♂

Eremopterix grisea

April 14 Monday

சித்திரை 2 திங்கள்



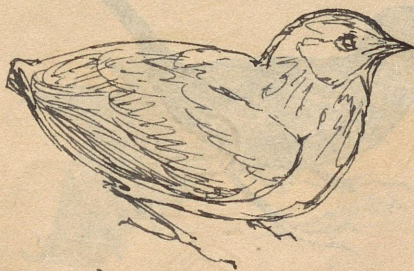
RGR

White Egret.

1980

April 15 Tuesday

சித்திரை 3 செவ்வாய்

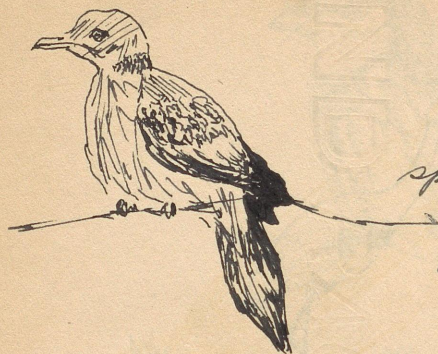


♀

RGR

April 16 Wednesday

சித்திரை 4 புதன்



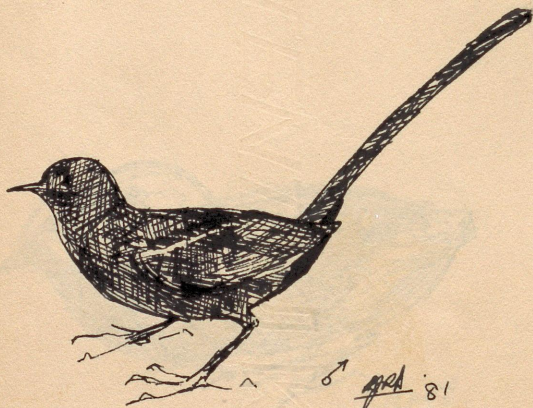
spotted dove

29/4

1980

April 17 Thursday

சித்திரை 5 வியாழன்



♂ 29/4 '81

The Indian Robin.

தன்

April 18 Friday

சித்திரை 6 வெள்ளி



April 18
 The common crow *Corvus splendens*

1980

ழன்

April 19 Saturday

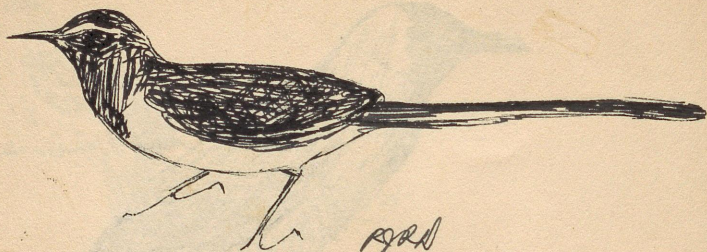
சித்திரை 7 சனி



April 19
 Jungle crow.

April 20 Sunday

சித்திரை 8 குடியியல்



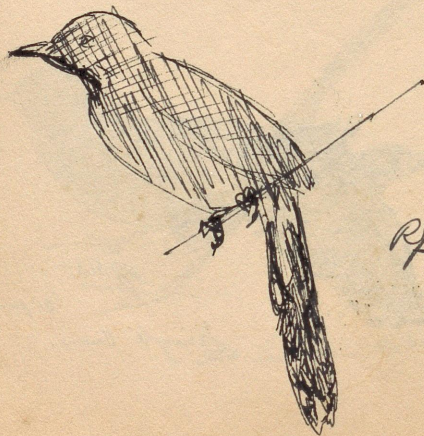
RPH
Mar '81

large-pied wagtail

1980

April 21 Monday

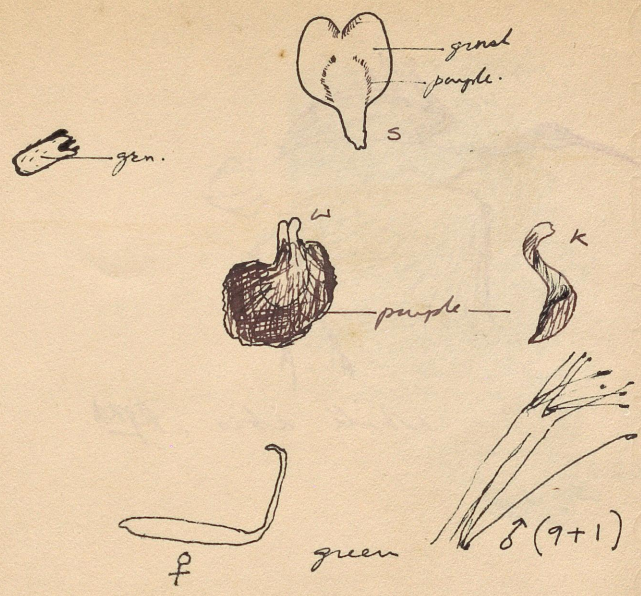
சித்திரை 9 திங்கள்



RPH

Plaintive cuckoo. (?)

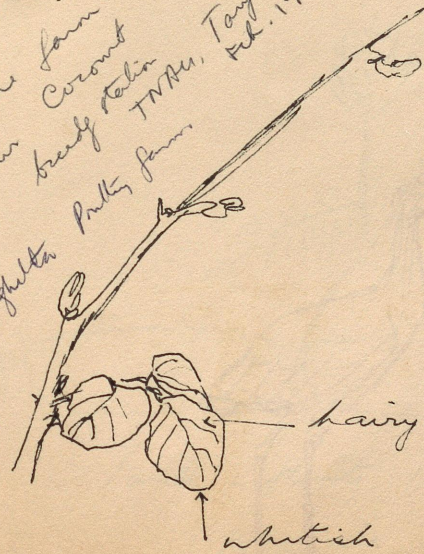
a grey bird - about 11 of a droop -
actively catching insects. tail feathers tip whitish
grey uniform - beak slightly hooked



The genus *Manoptelium* (Berth.)
U.R.C. - a new Record for India.

1980

also seen in the form
of Vepanur
1983: Hengulka Pully form
Corovent
Tamil Nadu, Tamil Nadu
Feb. 1982



JBNHS

MTL 77(2) 1980 357

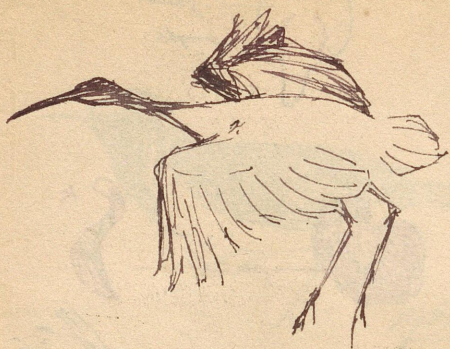
S.V. Subba Rao, Southern Circle, Botanical Survey
of India, Coimbatore 641002. July 25, 1979

Trifoliolate.

Creep. stem hairy RGR
AC+RI. Indu. 27. 8. 81

April 24 Thursday

சீத்திரை 12 வியாழன்

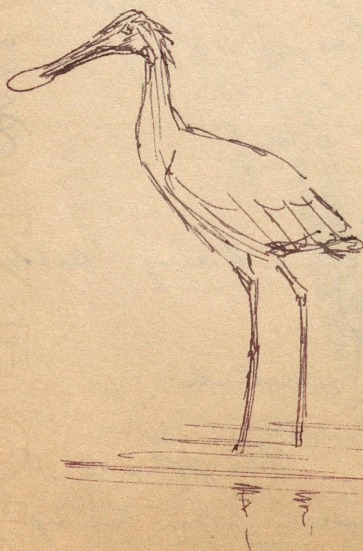


White ibis. R.P.R.A.

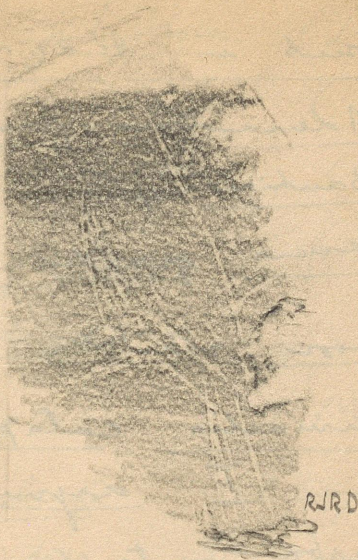
1980

April 25 Friday

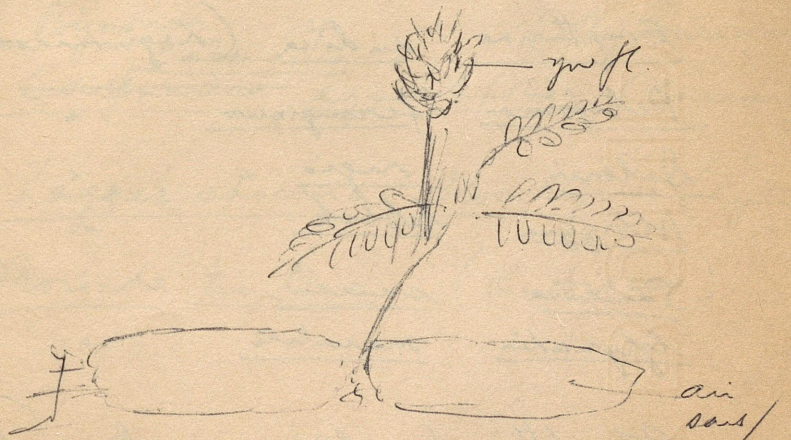
சீத்திரை 13 வெள்ளி



Spoonbill
R.P.R.A.



1980



Tank - floaty into in sl.

Neptunia oleracea

Mimosoidia

under RWRD 5.3.82

April 28 Monday

சித்திரை 16 திங்கள்

Trees in AER 1 ndu

Adenanthura pavonia (leguminosae)

Bauhinia sp

Cassia grandis

Amorosa rohittaka (Meliaceae)

Turmericia catappa (Combretaceae)

T. argina

Ceiba pentandra (Bombacaceae)

1980

April 29 Tuesday

சித்திரை 17 செவ்வாய்

Erythrina indica (leguminosae)

Pteroporum ferruginum

Delonix regia

Albizzia lebbek

Samanea saman

Glyricidia maublata

Polyalthia longifolia Apocyn (Annonaceae)

Azadirachta indica (Meliaceae)

Pythecobolium dulce (leguminosae)

Acacia arabica

<u>Prosopis juliflora</u>	(Leguminosae)
<u>Tamarindus indicus</u>	(")
<u>Acacia leucophloea</u>	(")
<u>Ficus benghalensis</u>	(Moraceae)
<u>F. religiosa</u>	"
<u>Eucalyptus sp.</u>	(Myrtaceae)
<u>Mimusops elengi</u>	(Sapotaceae)
<u>Mangifera indica</u>	(Anacardiaceae)
<u>Anacardium occidentale</u>	(")

1980

<u>Bigonia sp.</u>	(Bigoniaceae)
<u>Cassuarina</u>	
<u>Cassuarina equisetifolia</u>	(Cassuarina- ceae)
<u>Lagerstroemia flos-reginae</u>	(Lythra- ceae)
<u>Shorinda tinctoria</u>	(Rubiaceae)

May 2 Friday

சீத்திரை 20 வெள்ளி



a climber Ranunculaceae

Nararia zeylonica

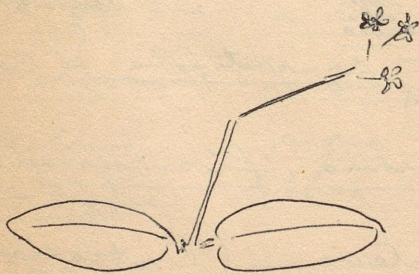
Bhairumbe

24. 11. '83

1980

May 3 Saturday

சீத்திரை 21 சனி



climber.

wh. flowers in
racemes
stalk, stem &
petiole red.
latex green.

Isorascapus frutescens

Apocynaceae

Bhairumbe

24. 11. '83

May 4 Sunday

சீத்திரை 22 சூரியறு



herb.

blue form is no upper leaf

leaf - is hair

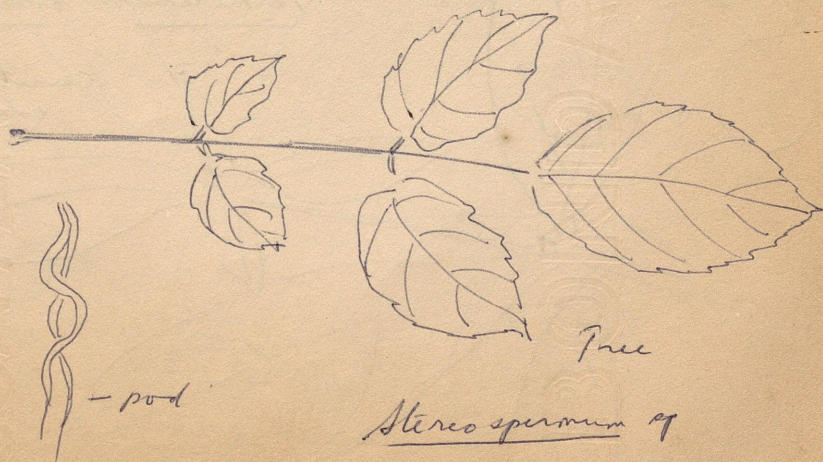
Blythain asperima

Acantaceae. 24.11.83
Bhairumbi

1980

May 5 Monday

சீத்திரை 23 திங்கள்



Tree

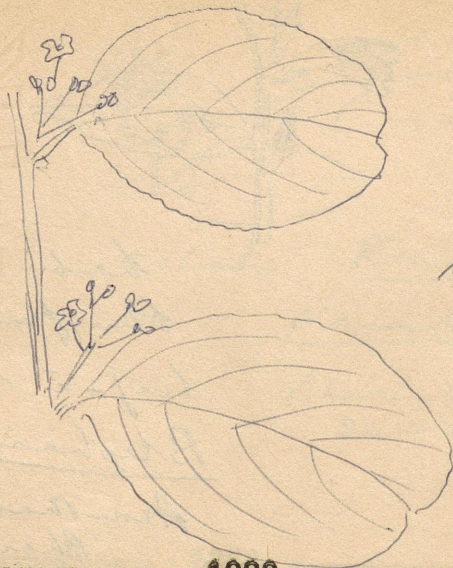
Stereospermum sp

Bigoniaceae 5.12.83

May 6 Tuesday

சீத்திரை 24 செவ்வாய்

Gynnosperma montana



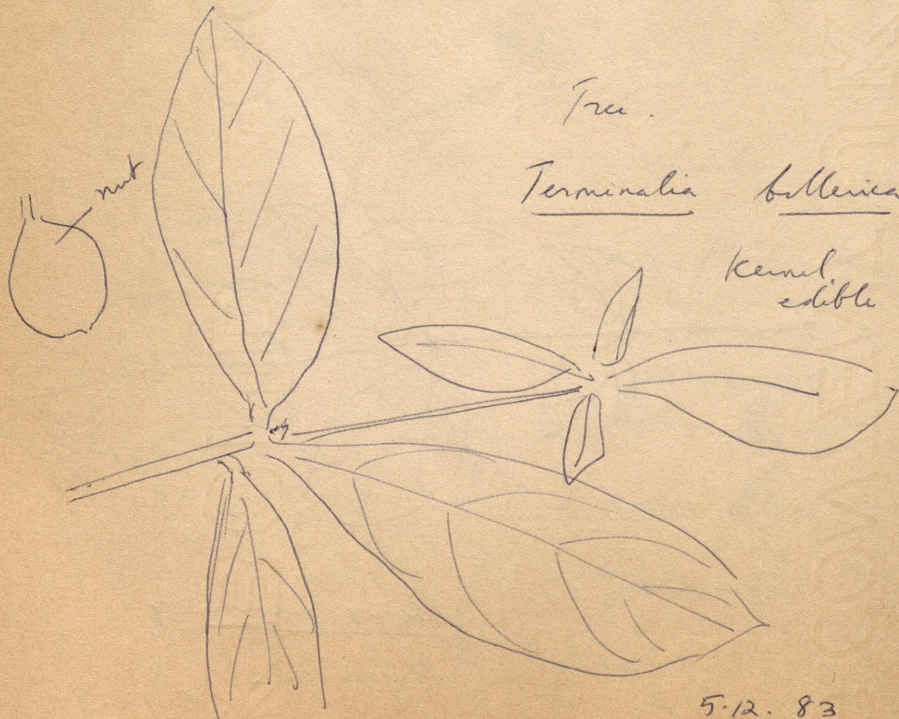
stem + petiole
leaf
near thick
shrub.

5.12.83

1980

May 7 Wednesday

சீத்திரை 25 புதன்



Tree.

Terminalia bellerica

kernel
edible

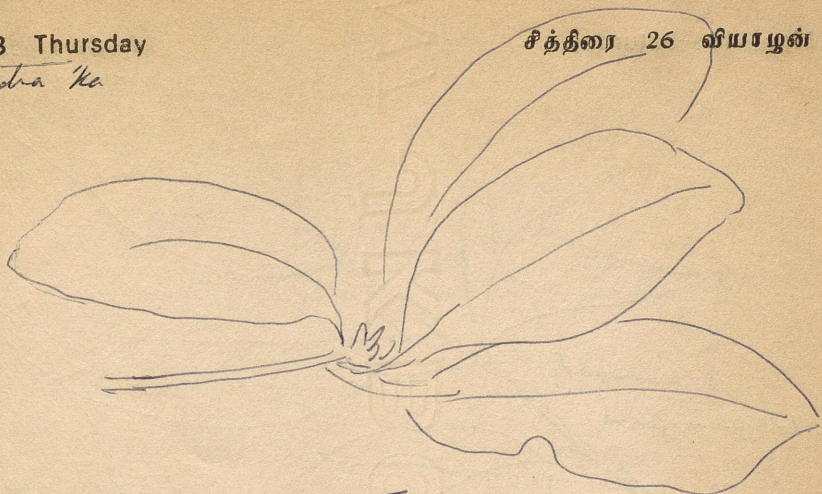
5.12.83

வரம்

May 8 Thursday

Bandra Ka

சித்திரை 26 வியாழன்



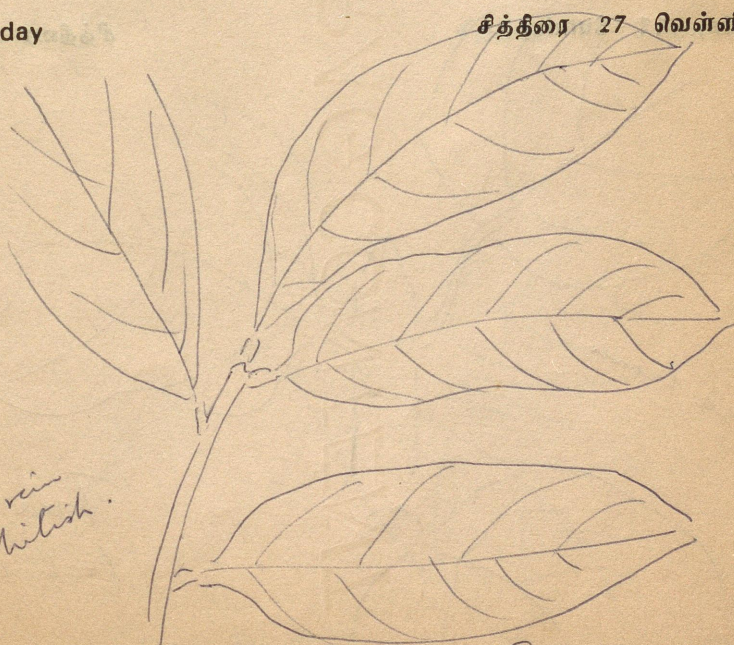
T. billeria

1980

தன்

May 9 Friday

சித்திரை 27 வெள்ளி



mid vein
whitish.

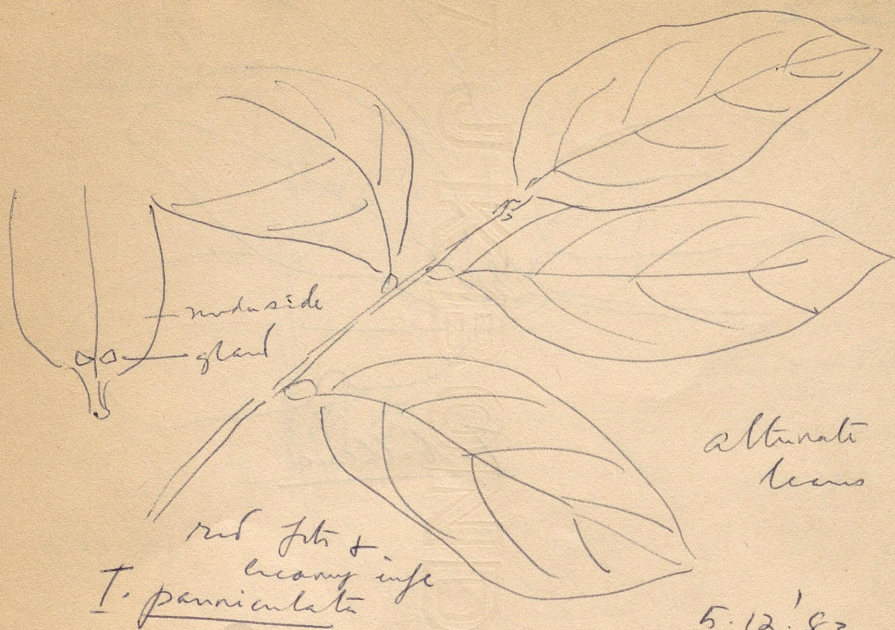
Buchrania lanigera

Tree
Thick coarse leaf

5.12.83

May 10 Saturday

சித்திரை 28 சனி



red felt +
creamy inf
T. paniculata

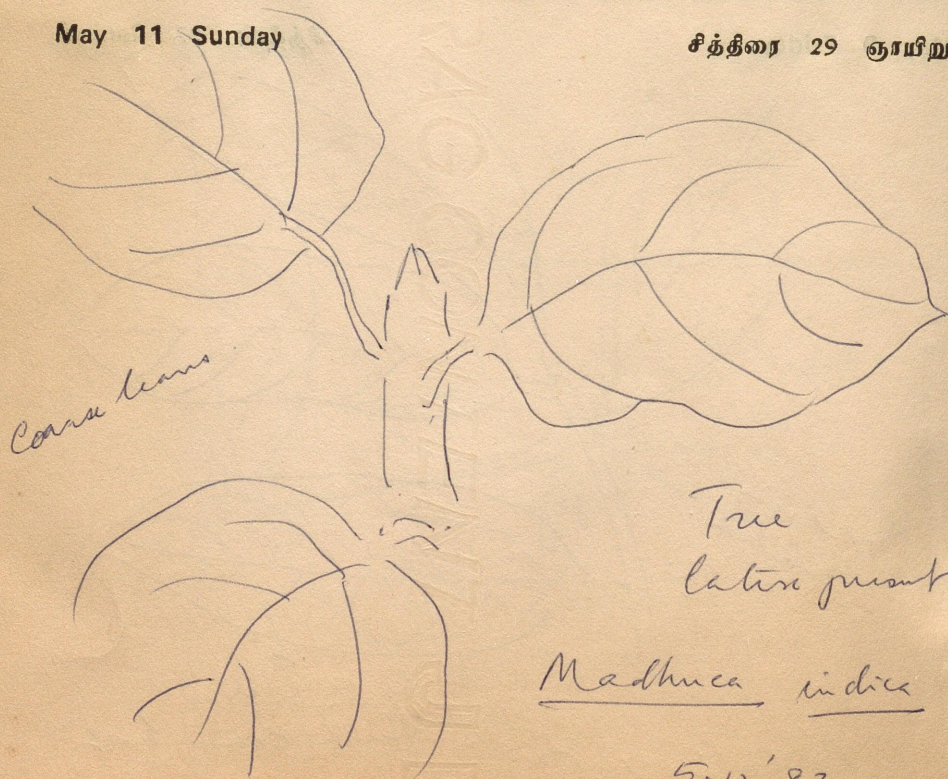
alternate
leaves

5.12.83

1980

May 11 Sunday

சித்திரை 29 குடியிற



Coriaceous
leaves

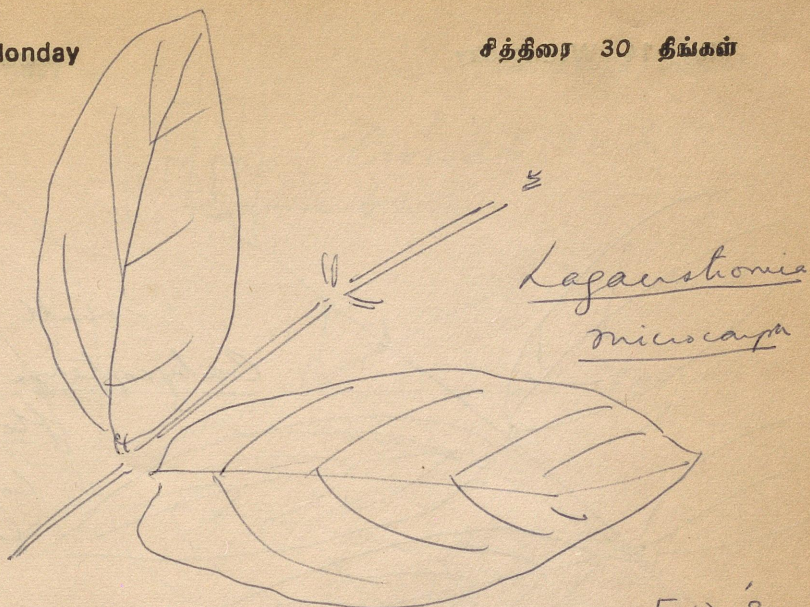
Tree
latex present

Madhuca indica

5.12.83

May 12 Monday

சுத்திரை 30 திங்கள்



Laganstonia
microcarpa

opposite leaves.
stem heavy & pulpy bark.

5.12.83

1980

May 13 Tuesday

சுத்திரை 31 செவ்வாய்



Tree.

Alecodaphne sp

Medicinal

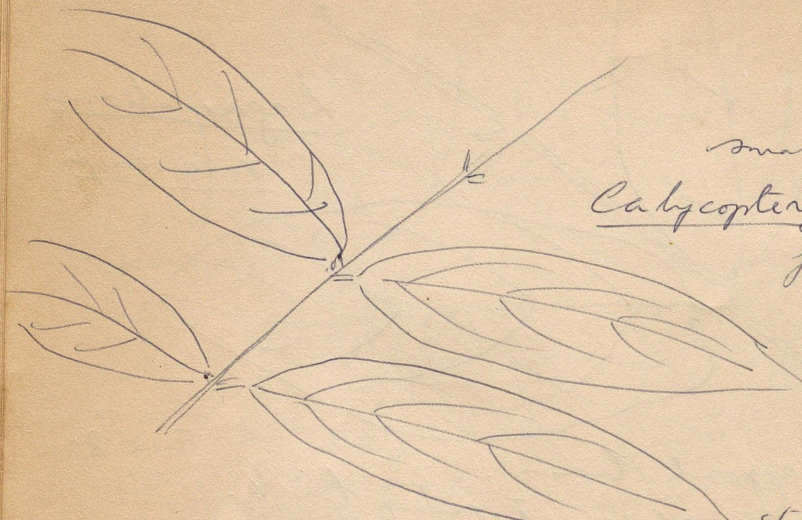
leaves like bark

odour present in leaves

5.12.83

May 14 Wednesday

வைகாசி 1 புதன்



small tree
Calycopteryx
floribunda

coarse
 lanceolate
 leaves

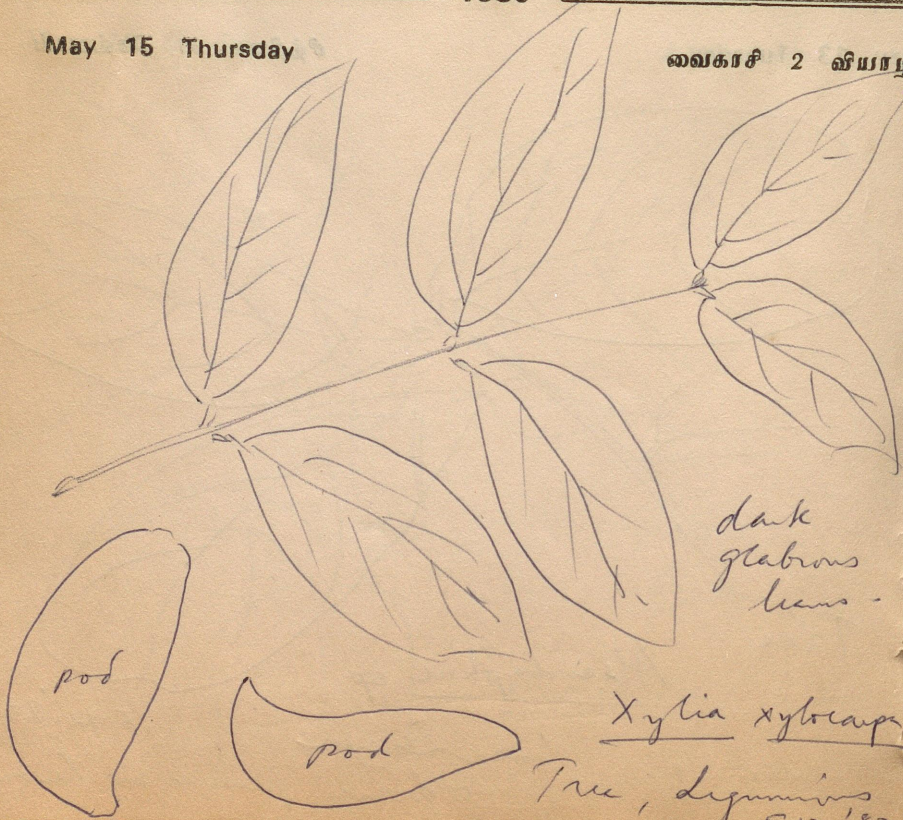
5.12.87

stem +
 petiole hairy

1980

May 15 Thursday

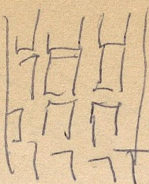
வைகாசி 2 வியாழன்



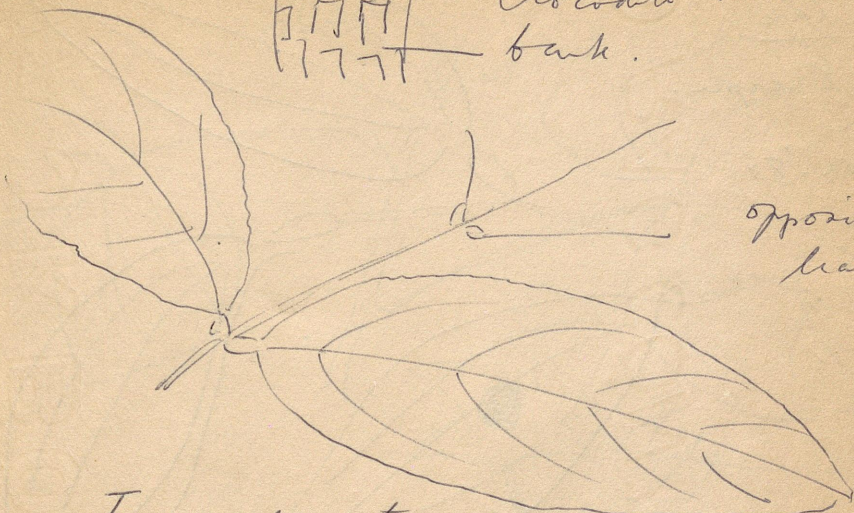
dark
 glabrous
 leaves

Xylocopa xylocarpa

Tree, Leguminosae
 5.12.83



Crocodile bark tree bark.

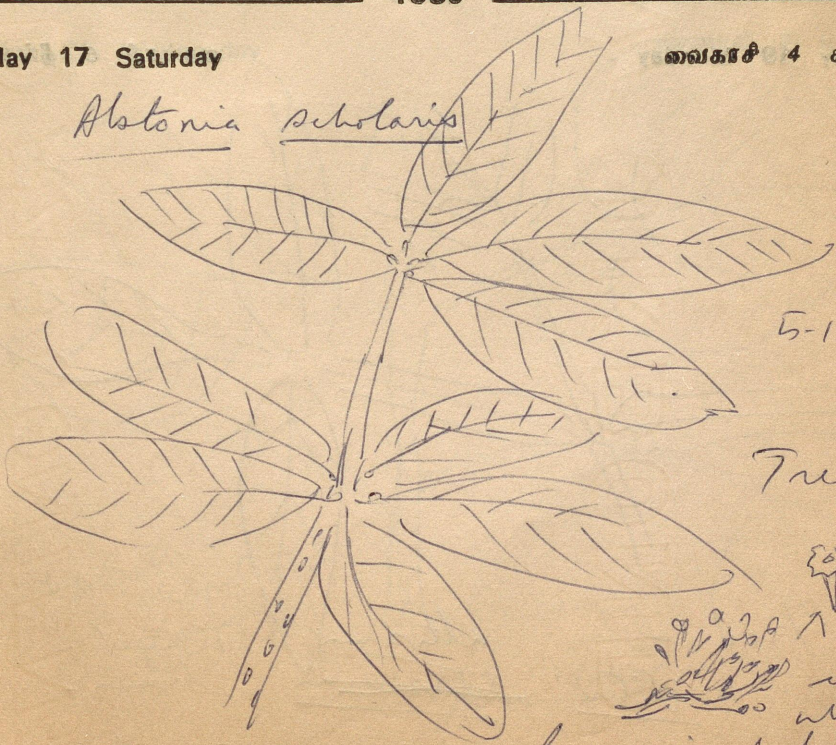


opposite leaves.

Terminalia tomentosa edges finely serrate glands present in leaf base.

1980

Alstonia scholaris



5-12-83

Tree

inf white
leaves in whorls.

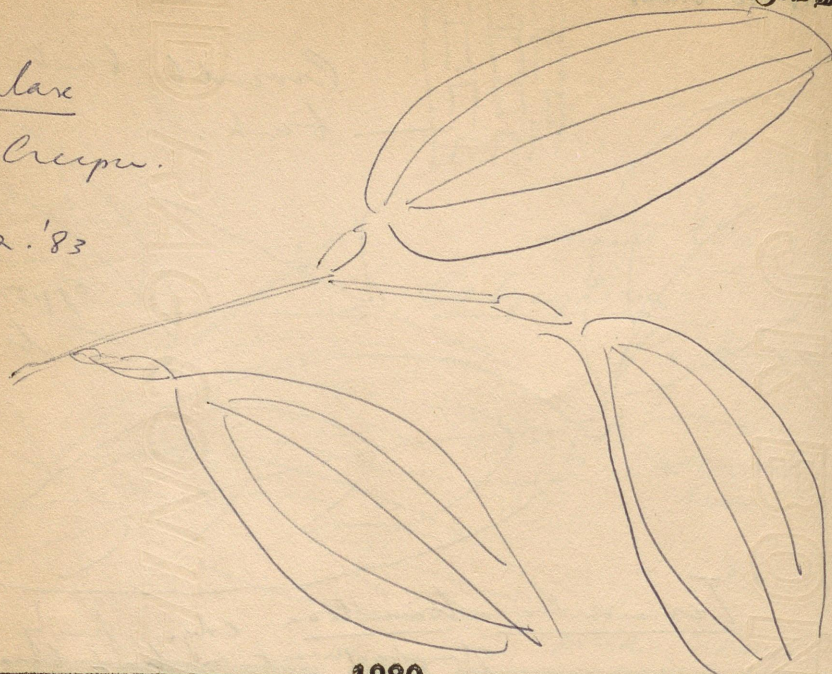
May 18 Sunday

வைகாசி 5 குடியிறு

Smilax

crepus.

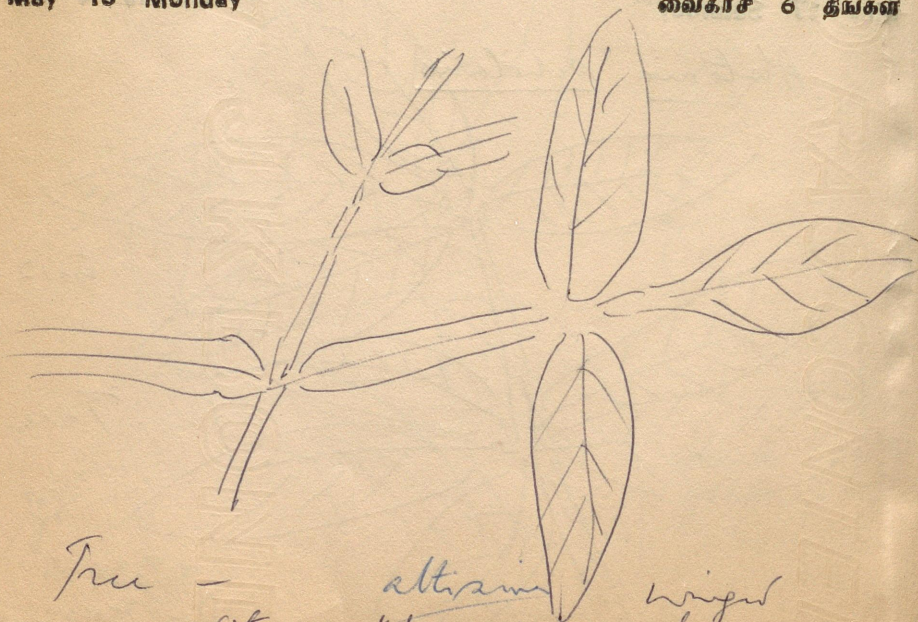
5.12.83



1980

May 19 Monday

வைகாசி 6 திங்கள்



Tree -

Vitis

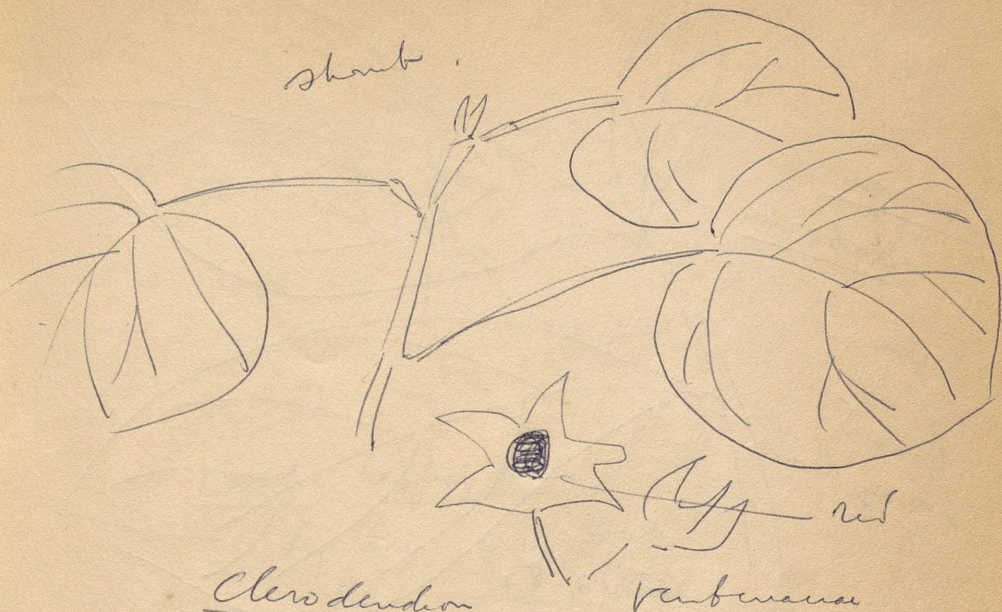
altissima

rotundifolia

winged
stem

leaves opposite

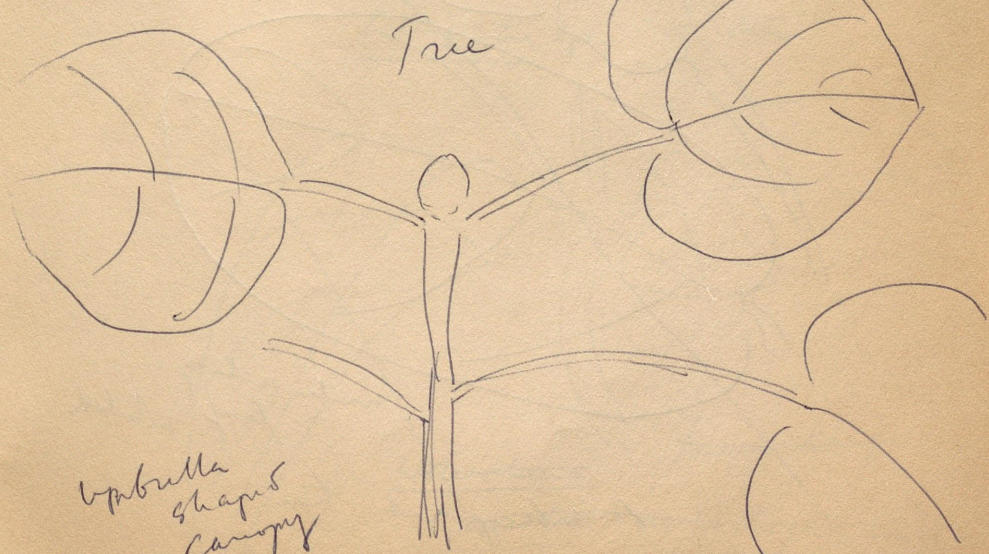
5.12.83



Clerodendron

verbena

1980



Tree

umbrella shaped canopy

opposite leaves

Adena cordifolia

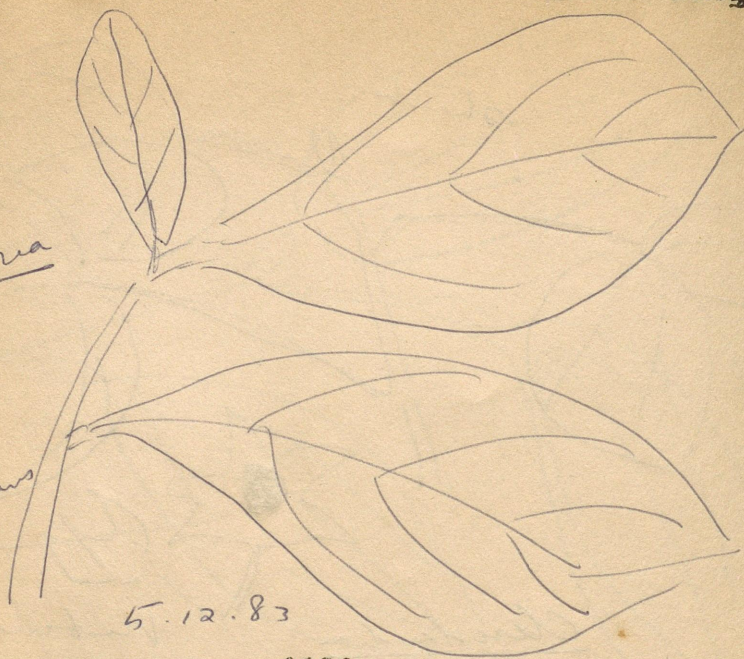
5.12.83

May 22 Thursday

வைகாசி 9 வியாழன்

Carex
arborea

Tree
broad
long leaves

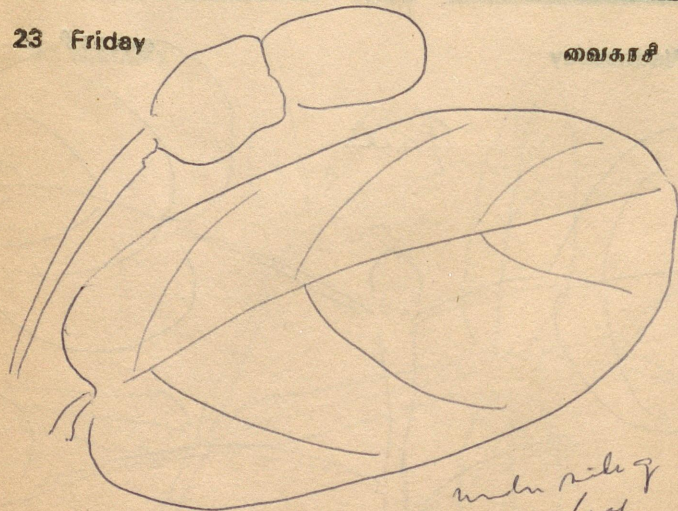


5.12.83

1980

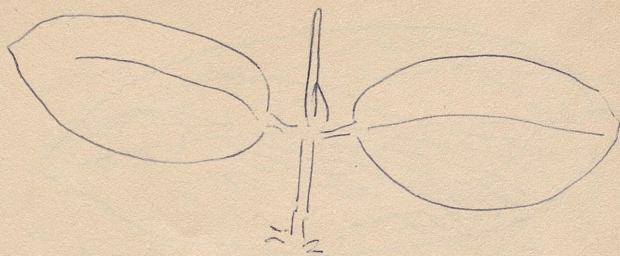
May 23 Friday

வைகாசி 10 வெள்ளி



under side of
leaf whitish

Marking out the
Semicarpus anceaticum
anceaticum
8.12.83

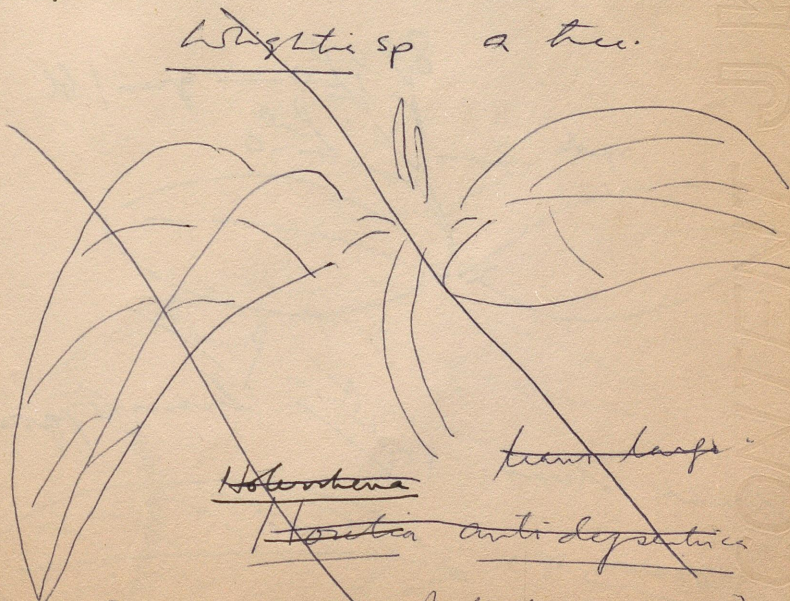


Carbin integrifolia

big tree, grey bark.
leaves waxy & thick.

1980

Wrightia sp a tree.



~~Holopterna~~

~~leaves large~~

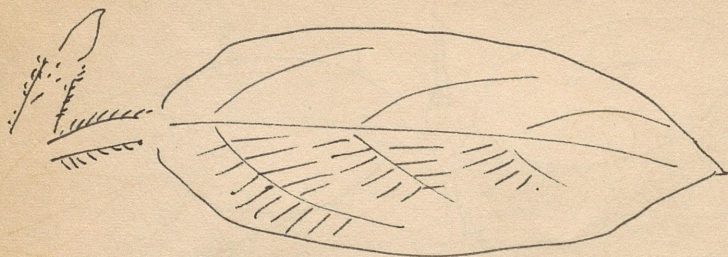
~~Arctostaphylos anti-depressiva~~

~~(Shrub like Adhatoda vasica)~~

Medicinal

May 26 Monday

வைகாசி 13 திங்கள்

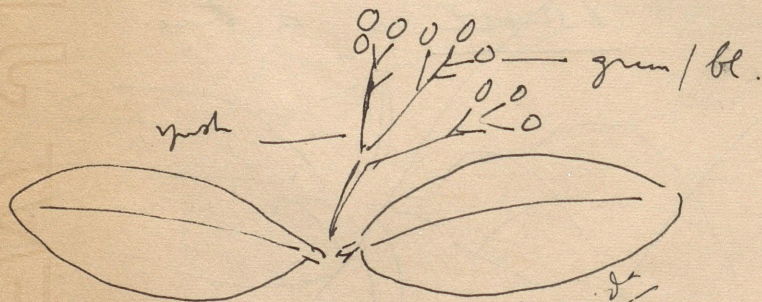


Tree. large leaf - small tree.
 petiole + shoot white pubescent
 under side of leaf whitish
Calycarpa sp

1980

May 27 Tuesday

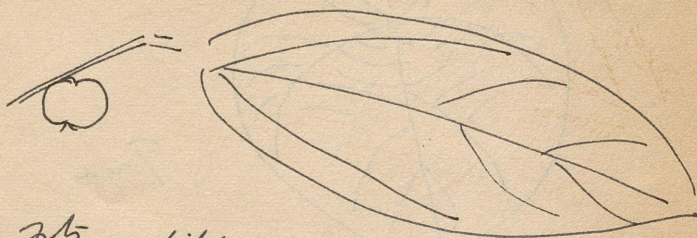
வைகாசி 14 செவ்வாய்



small shrub. Psychotria parviflora
 leaves opposite

Foreva sp.





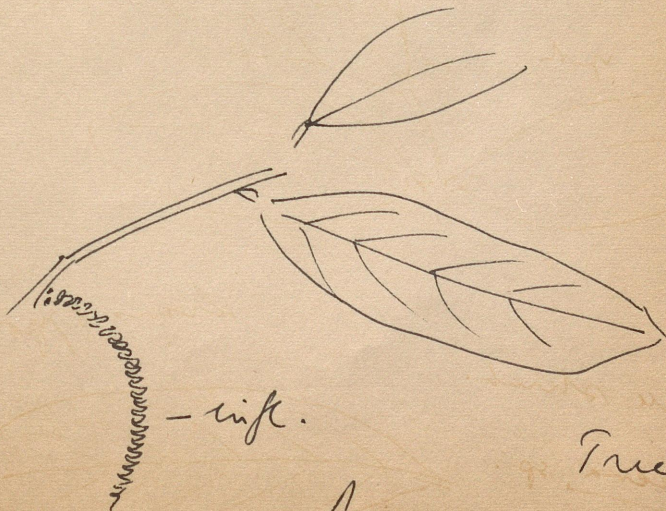
frt edible.

small tree.

Flucortia

montana

1980



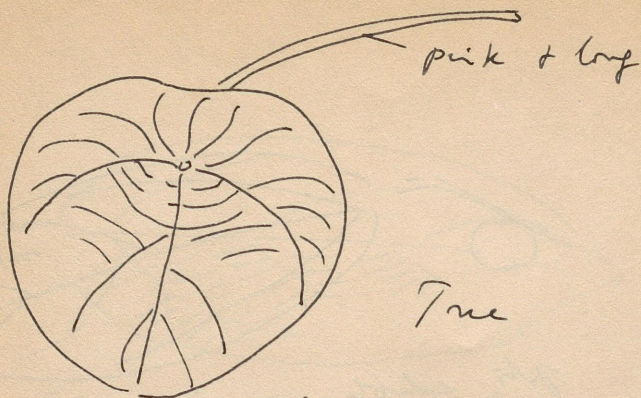
- inf.

Tree.

Aporosa sp.

May 30 Friday

வைகாசி 17 வெள்ளி



Tree

Macaranga sp

1980

May 31 Saturday

வைகாசி 18 சனி

Averrhoa bilimbi - Cucumber tree

Sclerocarya - elata - White Gull Nuts

Suaeda arborescens - white

Terminalia argentea

Solanum granadense

Gardenia sp. - Rubiaceae.

Maackia

Rotula sp. Lythraceae.

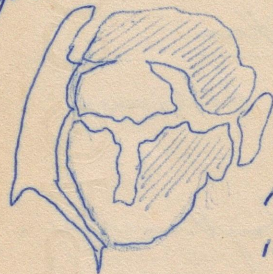
Cassia siamea yw Ac'RI CBE.

C. alata yw (candlestick)

1980

NOTES

- | | |
|----------------|------------------------------------|
| 1. Fore head | 6. Cheeks |
| 2. Crown | 7. Ear Coverts |
| 3. Nape | 8. Upper mandible (maxilla) |
| 4. Lores | 9. Lower " |
| 5. Supercilium | 10. Culmen / upper part of maxilla |

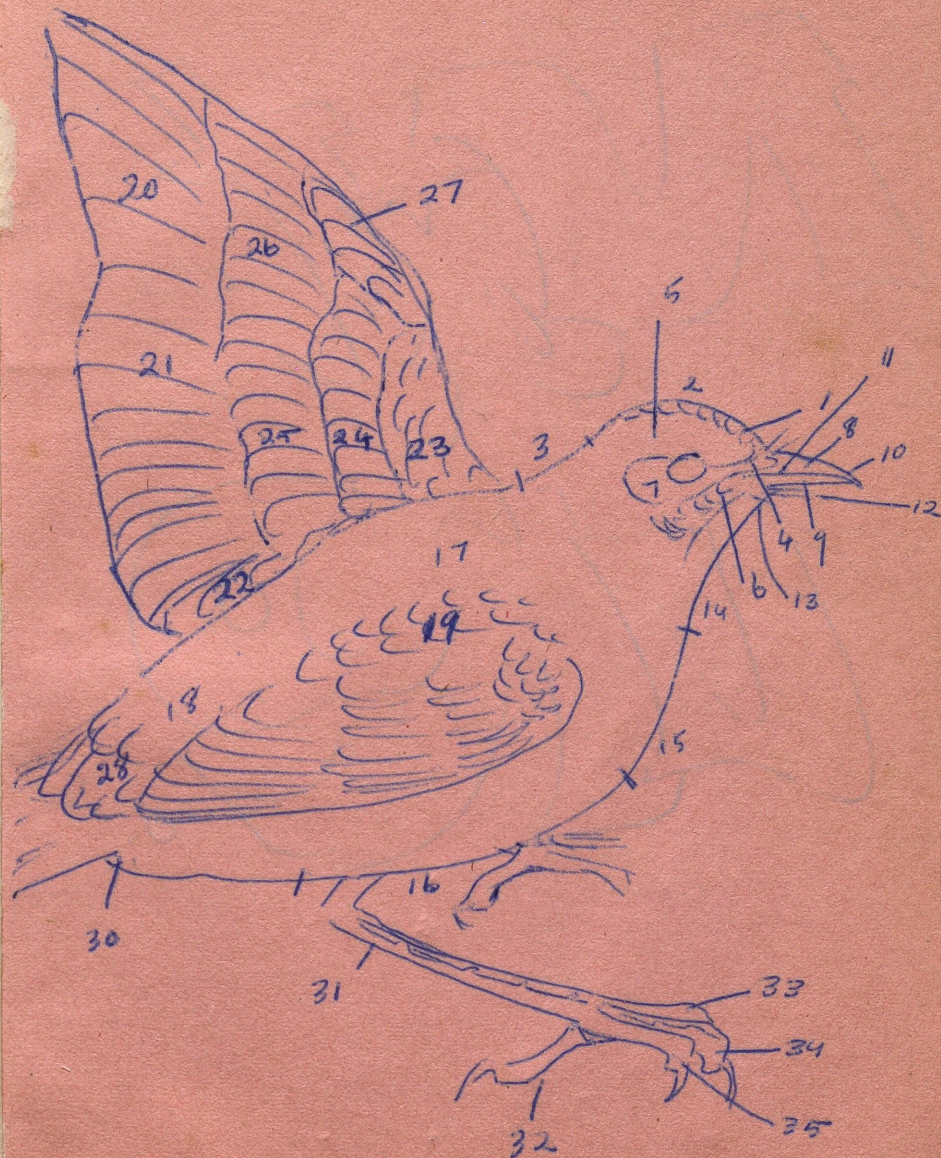


- | |
|---------------------|
| 11. Commissure |
| 12. Rictal Bristles |
| 13. Chin |
| 14. Throat |
| 15. Breast |
| 16. Abdomen |
| 17. Back |
| 18. Rump |

- | |
|-------------------------|
| 19. Scapulars |
| 20. Primaries |
| 21. Outer secondaries |
| 22. Inner " |
| 23. Lesser wing coverts |
| 24. Median " |
| 25. Greater " |
| 26. Primary coverts |
| 27. Wing let. |
| 28. Upper tail coverts |
| 29. Tail feathers |



- | |
|--------------------------|
| 30. Under tail coverts |
| 31. Tarsus |
| 32. Hind toe / 1st toe |
| 33. Inner toe / 2nd toe |
| 34. Middle toe / 3rd toe |
| 35. Outer toe / 4th toe |



13920

Not

to

APERTURE FOR
FLASH \bar{c}
EXT. TUBES

Distance: Object to lens

30 cm 0.8 of \bar{c} thick
flash

15 cm 0.7

12 cm 0.6

110 in my flash

30 cm 8.8 }
15 cm 7.7 }
12 cm 6.6 }

