SMV HSS POONJAR

Influence of Moon Phases on Cultivation & Harvesting :- A Scientific Study

Group Members:
Bhavani M Varma
Amitha Varma A
Lakshmi Suresh
Meghna Varma

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ABSTRACT

Kerala is famous for its rubber plantations. But very recently,due to the huge fall in price of rubber many young farmers have started planting tapioca in large scale. Here too, they face obstacles like less crop yield, pest infestations etc. according to the beliefs of old people in our society , cultivation in accordance with lunar phases will help to overcome these problems. We studied the subject by making a hypothesis:- "Do moon phases influence cultivation and harvesting"? We have done Surveys, Interviews, Observations and Experimentations.

We planted 60 peperomia plant separately in a controlled system and everyday through a moon phase, we took sections of two plants each, after adding 10 ml of fluorescent ink in the soil before 10 hours. Using a mobile gear universal 68 x Microscope Macro Mobile Camera lens with U V light we took photographs of 100s of sections in all 28 days and found that fluorescent ink spreads in the xylem tubes more during New moon and coming 3 days. Then we took 50 sections from tender stalks of Manihot Utilissima (Tapioca) from a farm and observed them through a moon phase and found that sections cut after new moon reduce its size soon and found more cavities when compared to sections taken after full moon and also observed that fungi and insect attacks on the sections taken after new moon are more .

Next, we collected 1 cm long tender stalks each day for three moon phases from Manihot Utilissima , Eupatorium Bauhinia plants which are in abundance in our area and kept information before examining the sections using a compound microscope. We observed that the number of new cell layers formed in the plants are more during the new moon and successive days. we also collected the sap from live tapioca plants every day during moon phases and found that the weight of sap collected is more during new moon days. During new moon days we experimentally proved that capillary rise of water is more in the soil .

By taking all these results into consideration, we concluded that during new moon and successive days sap wood (outer sections) of plants becomes more tender than other days and is vulnerable to the attacks of insects like furniture beetle, Chlorophorus Annularis, Stromatium Barbatum, Lyctus Africanus etc. , which attack the timber and stem. On the new moon day Moon and Sun are present in the sky all day long and the attractive force (even though it is very small compared to Earth's Gravitational Force) of Moon and Sun may c use change in the biological rhythms of plants. Sharing these traditional knowledge backed by science, among young farmers in the society, will help to reduce the excessive use of chemical pesticides at the time of cultivation. It will also help to adopt a scientifically proven tradition and culture and inculcate love for traditional agricultural practices which are very much eco-friendly and low cost.

PREFIX

In our society there exist many valuable and useful pieces of information that are transferred from generations to generations. But among the young generation , the practice of these traditional knowledge and to study the science behind these practices is decreasing day by day. It's our duty to make use of our good old beliefs and tradition for the betterment and sustained development of the society.

The young people are totally unaware of the influence of lunar phases on cultivation and harvesting. This results in the shortage of crop yield and pest infestation. Cutting wood regardless of lunar phases may cause damage to furniture wood easily. The immediate solution adopted by farmers is the excessive use of chemical fertilizers and pesticides. Carpenters are also forced to treat the wood with chemicals. This can be avoided if we follow lunar phase for cultivation and wood cutting. But no scientific study is done to prove the influence of moon phases on cultivation till this date.

We made the hypotheses on this and decided to study the subject scientifically. By doing this we aim to share the traditional knowledge of the old which may help the young farmers to build up a new agricultural tradition highly in tune with nature.

We selected ward 7 of Poonjar Grama Panchayath and completed the study in 4 moon phases.

HYPOTHESIS:

Do moon phases affect cultivation and harvesting?

AIMS AND OBJECTIVES:

1. To know the science behind the traditional method of agriculture based on moon phases.
2. To know how moon phases affect plant growth.
3. To know whether the farmers in our society have knowledge of traditional agriculture and how it affects crops.
4. To know the relation between moon phases and pest infestation.
5. To know whether the traditional knowledge about moon phases is useful in the field of agriculture.

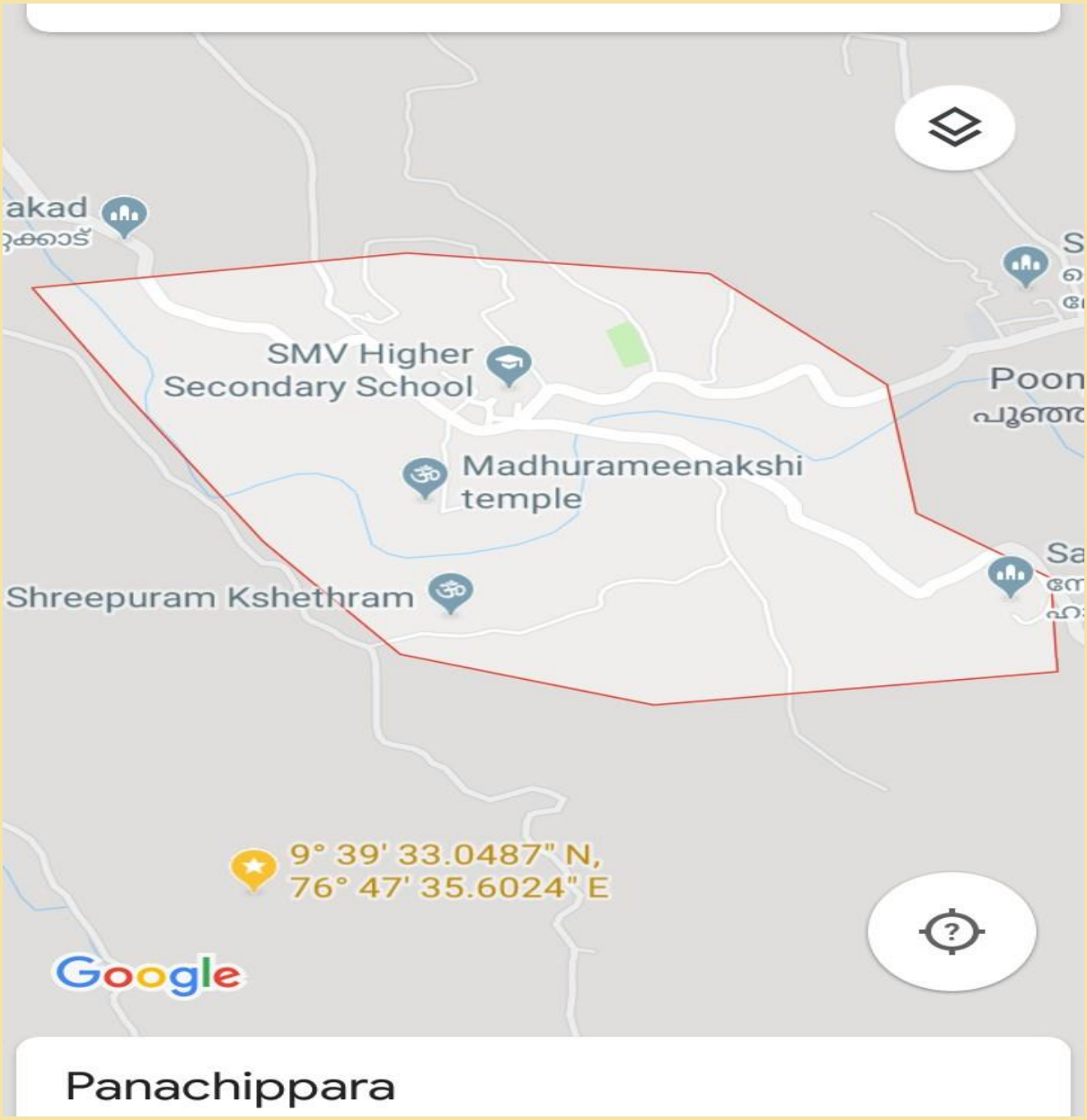
METHODS OF STUDY

Study through Survey, Interviews, Experiments, Observations through four moon phases.

Experiments & Results

SURVEY & INTERVIEW

We conducted survey and interviews among 50 well known farmers of **Ward 7 of Poonjar Grama Panchayath** to know whether moon phases affect crops

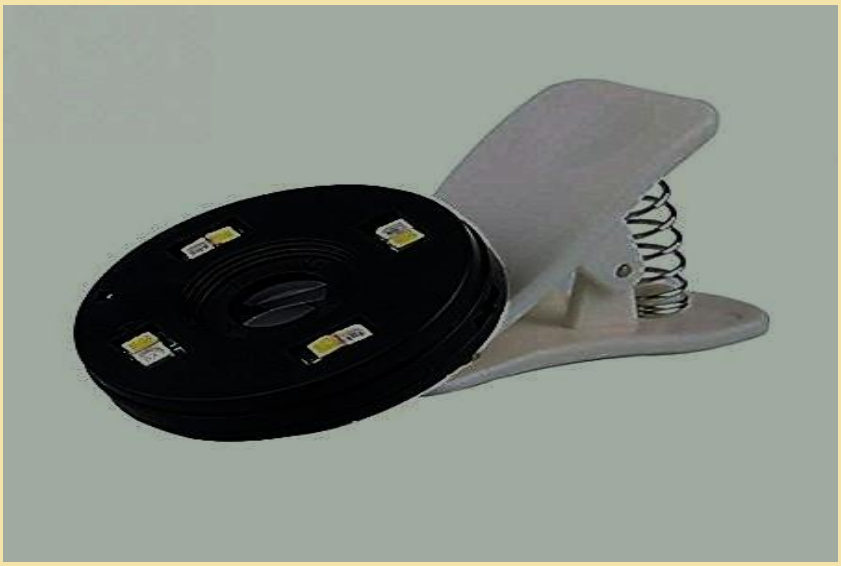


Experiments with peperomia plants grown in Cups

Among the 60 peperomia plants two were selected and poured 10 ml of ink everyday from one new moon to the next new moon day. Measured the height of the ink column absorbed by the plant in exact time. The humidity of soil was measured using generic 3in PH soil/moisture/light test mete and soil moisture meter(OEM). Then, took the thin sections of peperomia stem every day and placed them on a graph paper. Analysed the pictures of these sections using mobile gear universal 68*microscope macro mobile camera lens.

Testing Light intensity using Light Meter

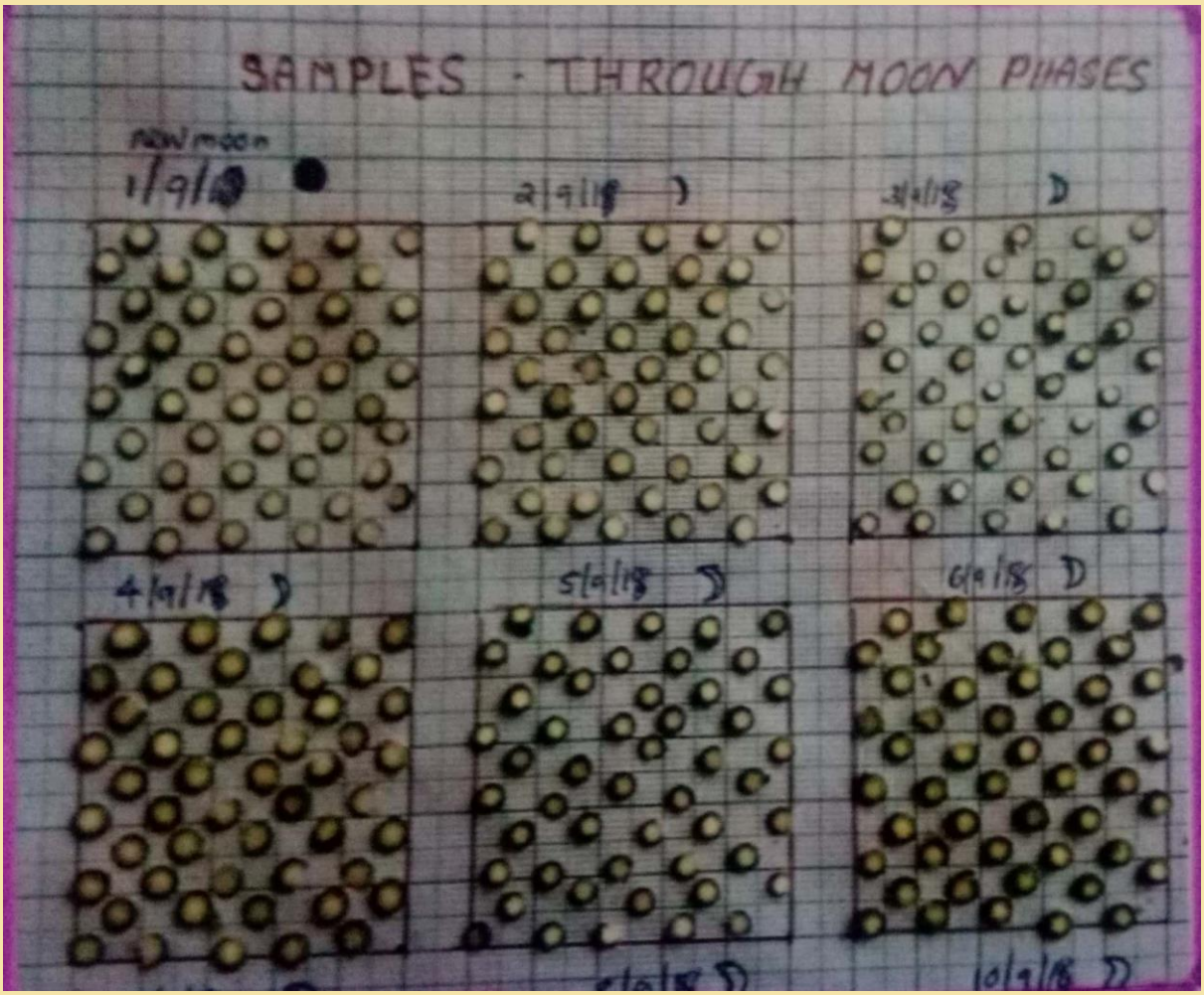
Mobile Gear Universal 68x Microscope Macro Mobile Camera Lens



Experiments with tapioca stalk

From a feild of about 300 tapioca plants, collected 50 stem sections (1 mm) continuously for 28 days. With the help of mobile gear universal 68*microscope macro mobile camera lens observed the pests, fungus and the changes occurring in cells.

Tapioca stems of 50 each placed on graph paper for observation



Experiment to prove whether moon phases influence new cell layers in plants

During 3 moon phases (3 new moon and 3 full moon) cut stems of 1 cm length at the same time everyday and kept in diluted formalin. Eupatorium, Bauhinia and Manihot Utilissima were used for this. After each moon phase observed the sections through compound microscope and counted the newly formed cell layers.

1 mm long stems of Eupatorium, Bauhenia and manihot Utilissima kept in formalin

Experiment to know whether the sap content vary due to moon phases

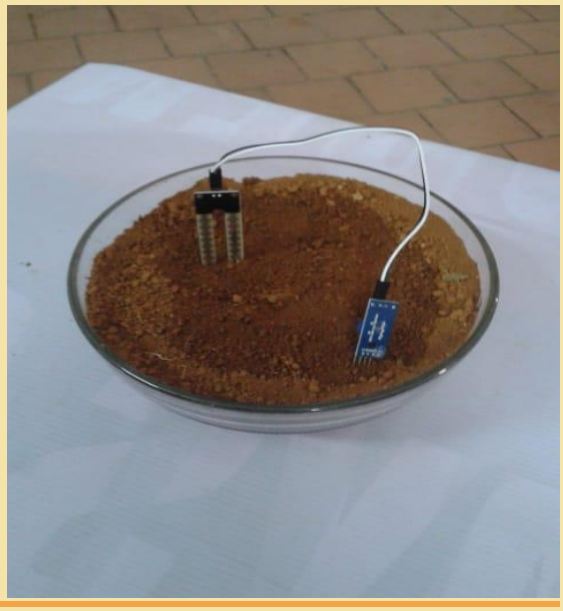
Made 10 small cuts with a new blade on 10 tapioca stems grown in the sample field and collected the sap using a tissue paper which is previously weighed using electronic balance. The new weight is again calculated for finding out the amount of sap came out from the plant and this experiment continued for one moon phase.

Collecting sap from tapioca stem

Experiment to know wether the capillary rise increases due to moon phase.

Among 30 kg of finely sieved soil, collected 1 gm every day and heated in a microwave oven for five minutes to dry it completely. Then took 50 ml of water in a flat vessel and is tightly packed with I kg of soil. Placed the electrode of generic 3in PH/Soil moisture/Light Test meter 1 cm deep in the soil and marked presence of humidity in soil. This experiment is done through moon phases and collected information.

Testing the Humidity of Soil through Moon Phases



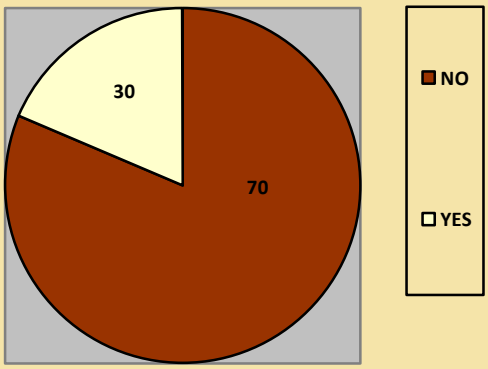
METHOD ADOPTED TO IDENTIFY PESTS

Collected information about pests attacking tapioca and other wood from experts and browsing net. Observed the presence of these pests.

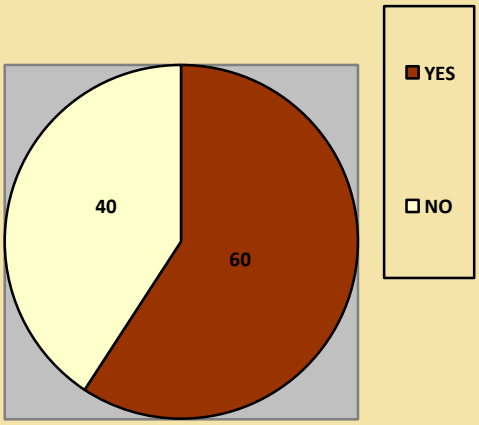
RESULTS

Do you Know about Moon Phases?

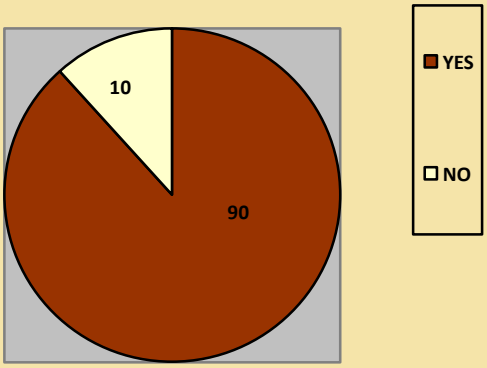
Age 30-40



Age 41 – 60

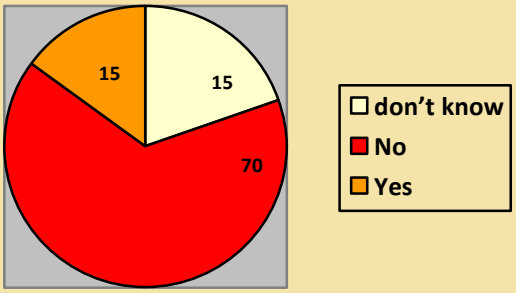


Above 61

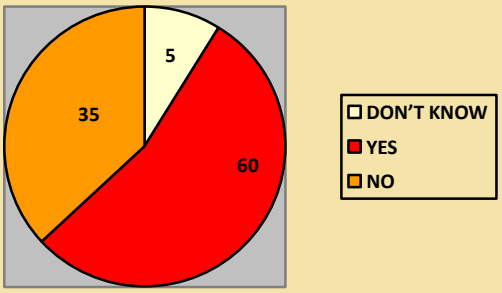


Do you depend moon phases for cultivation?

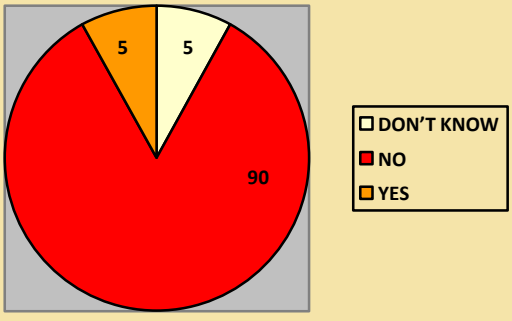
Age 30 – 40



Age 41 – 60

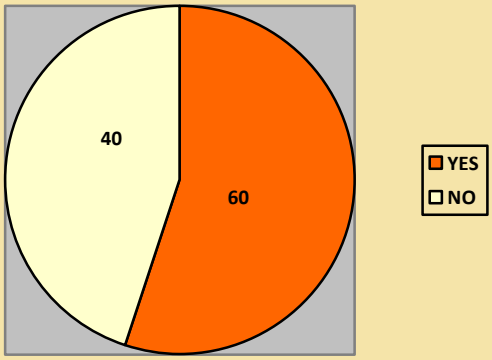


Above 60

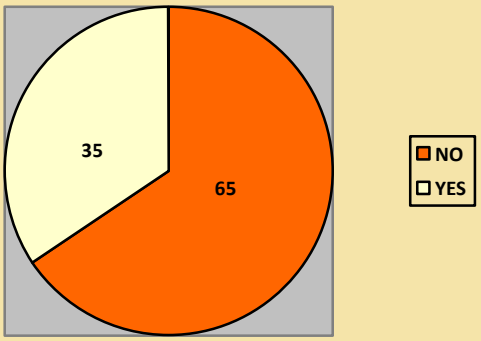


Do you think there is scientific reasoning behind this?

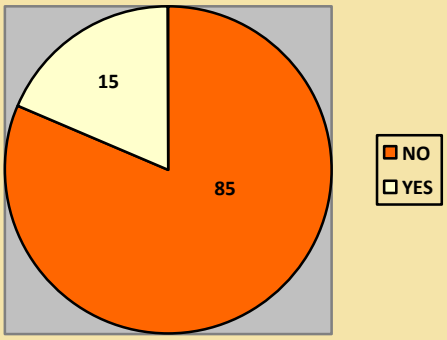
Age 30 – 40



Age 41 – 60

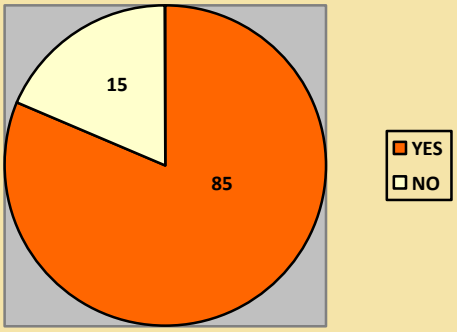


Above 60

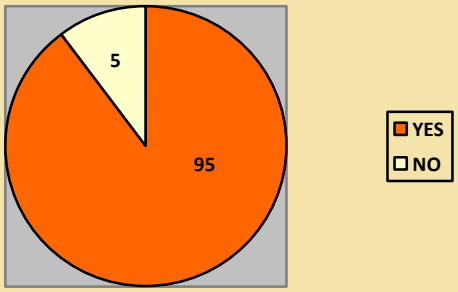


Do the changes caused by moon phases adversely affect cultivation?

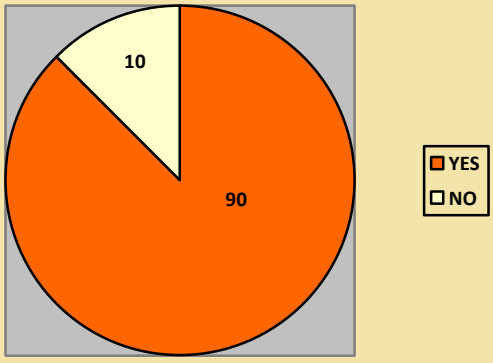
Age 30 – 40



Age 41 – 60



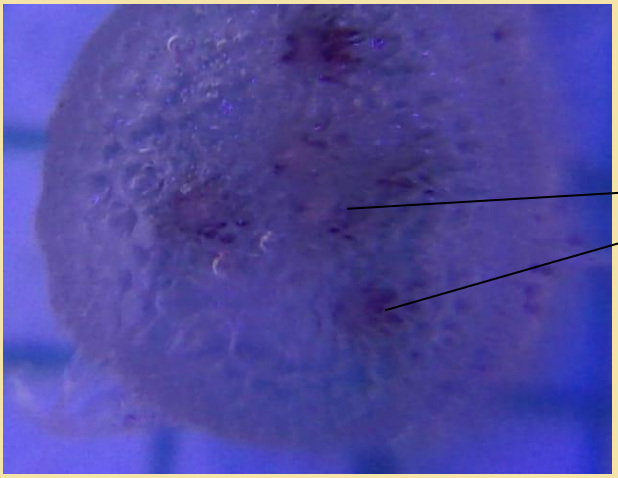
Above 60



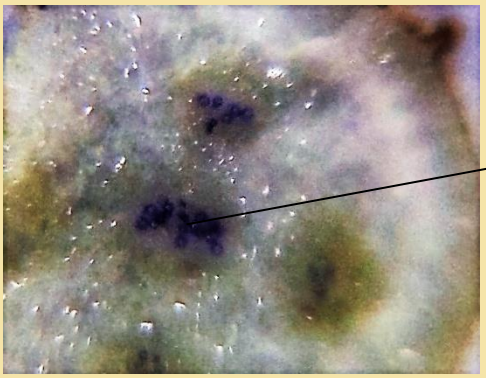
Information collected from peperomia plants grown in a controlled sysyem for observation.

No	Date	Temperature		Humidity	Moisture	Luminous Intensity
		Min	Maxm			
1	1/7/18	26^{0}C	31	66%	4	15000-20000
2	2/7/18	26^{0}C	31^{0}C	70%	4	15000-20000
3	3/7/18	25^{0}C	32^{0}C	69%	4	15000-20000
4	4/7/18	28^{0}C	33^{0}C	72%	4	15000-20000
5	5/7/18	24^{0}C	29^{0}C	65%	4	15000-20000
6	6/7/18	28^{0}C	26^{0}C	64%	4	15000-20000
7	7/7/18	26^{0}C	26^{0}C	71%	4	15000-20000
8	8/7/18	25^{0}C	26^{0}C	69%	4	15000-20000
9	9/7/18	29^{0}C	26^{0}C	64%	4	15000-20000
10	10/7/18	27^{0}C	26^{0}C	63%	4	15000-20000
11	11/7/18	31^{0}C	26^{0}C	67%	4	15000-20000
12	12/7/18	28^{0}C	26^{0}C	65%	4	15000-20000
13	13/7/18	29^{0}C	26^{0}C	68%	4	15000-20000
14	14/7/18	24^{0}C	26^{0}C	71%	4	15000-20000
15	15/7/18	29^{0}C	26^{0}C	69%	4	15000-20000
16	16/7/18	25^{0}C	26^{0}C	65%	4	15000-20000
17	17/7/18	28^{0}C	26^{0}C	66%	4	15000-20000
18	18/7/18	29^{0}C	26^{0}C	69%	4	15000-20000
19	19/7/18	32^{0}C	26^{0}C	70%	4	15000-20000
20	20/7/18	27^{0}C	26^{0}C	69%	4	15000-20000
21	21/7/18	30^{0}C	26^{0}C	65%	4	15000-20000
22	22/7/18	29^{0}C	26^{0}C	70%	4	15000-20000
23	23/7/18	27^{0}C	26^{0}C	65%	4	15000-20000
24	24/7/18	30^{0}C	26^{0}C	67%	4	15000-20000

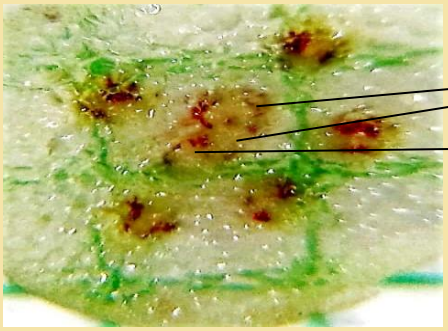
25	25/7/18	28^0C	26^0C	64%	4	15000-20000
26	26/7/18	25^0C	26^0C	63%	4	15000-20000
27	27/7/18	30^0C	26^0C	66%	4	15000-20000
28	28/7/18	24^0C	26^0C	64%	4	15000-20000
29	29/7/18	27^0C	26^0C	70%	4	15000-20000
30	30/7/18	29^0C	26^0C	73%	4	15000-20000
31	31/7/18	26^0C	26^0C	68%	4	15000-20000



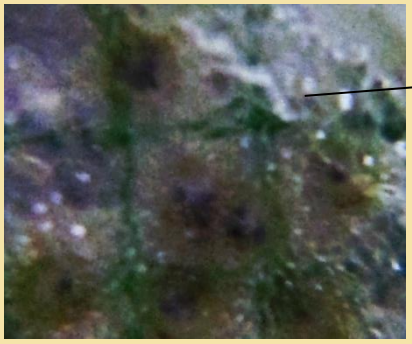
Section of peperomia plant 2days after New Moon.[U V light] More ink is spread in xylem tubes



Section of peperomia plant taken 2 days after Full Moon. No ink is spread

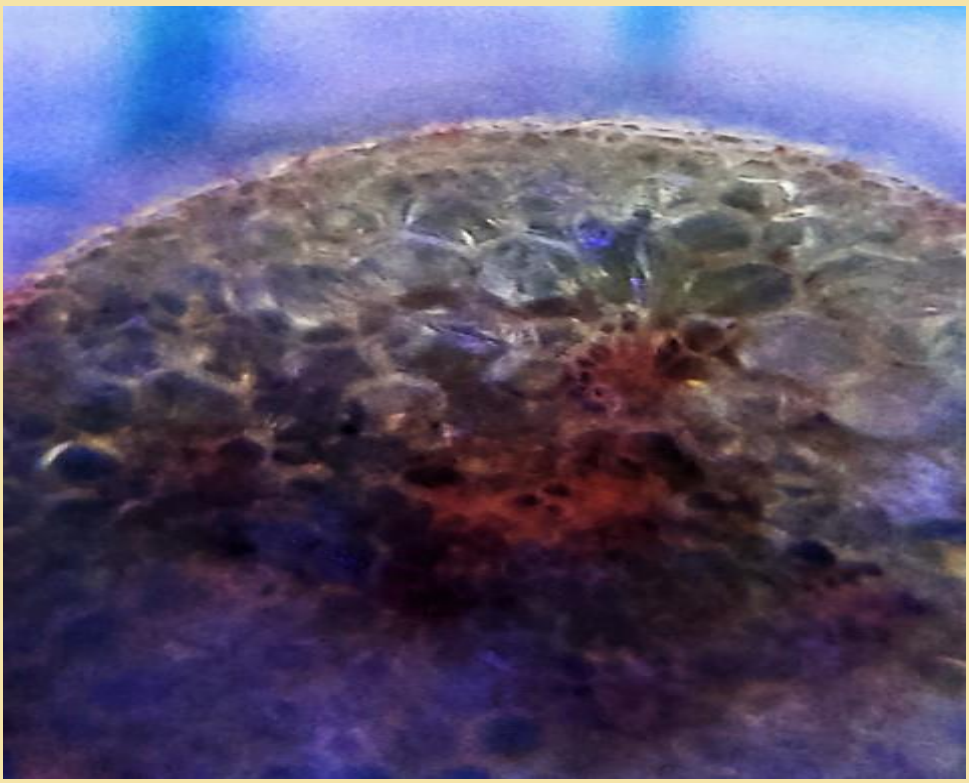


Peperomia section on graph paper[1 mm area]. More ink spread after New Moon

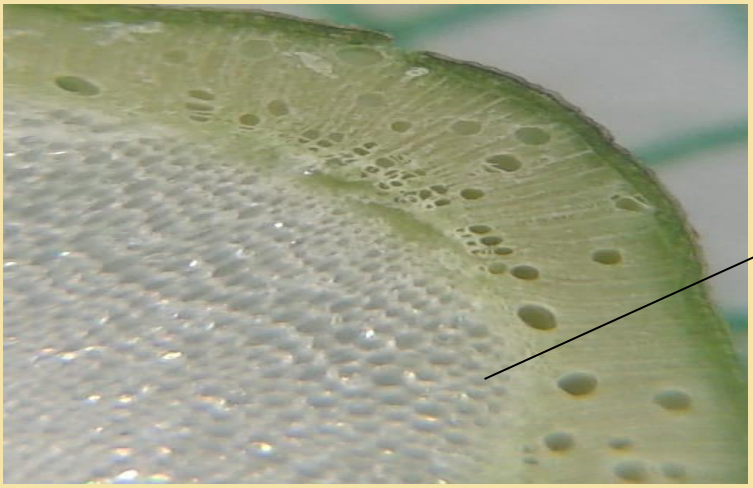


Section after Full Moon. Less ink is spread.

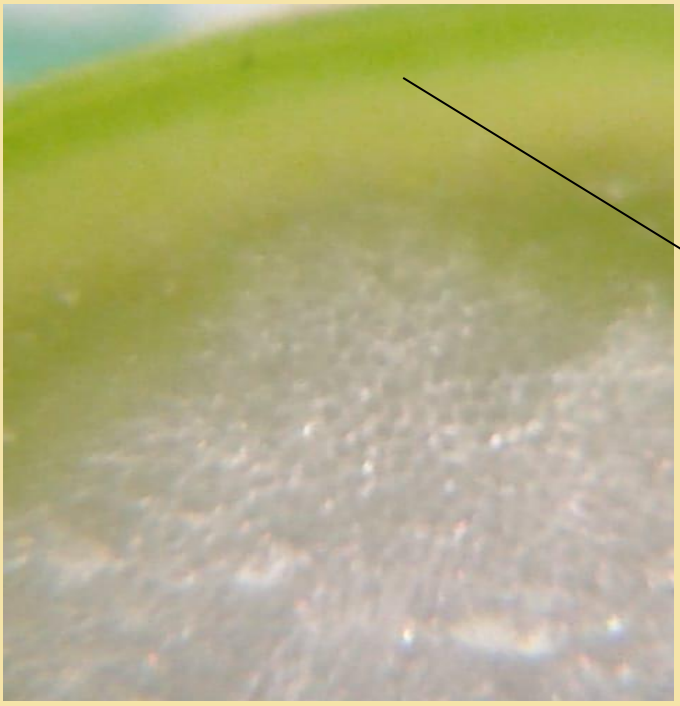
Section taken 2 days after New Moon. More ink is spread in xylem tube.[U V Light]. The part can be seen in red colour.



Peperomia – Longitudinal section

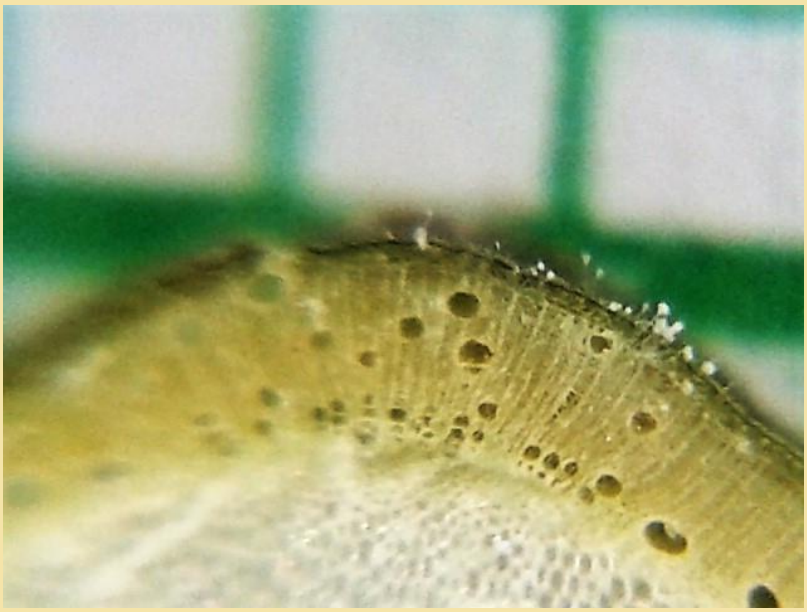


Section of tapioca stem 2 days after New Moon. Small round pores can be seen in the section



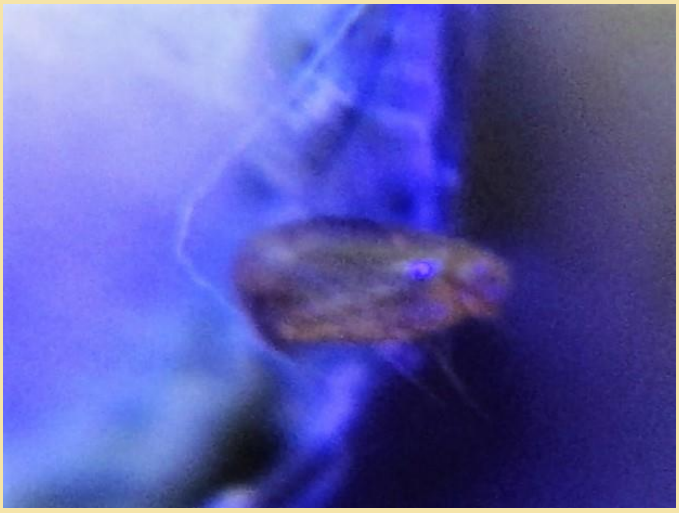
Section of tapioca stem 2 days after Full Moon. No pores can be seen.

Section of tapioca stem affected with fungus - 5 days after New Moon

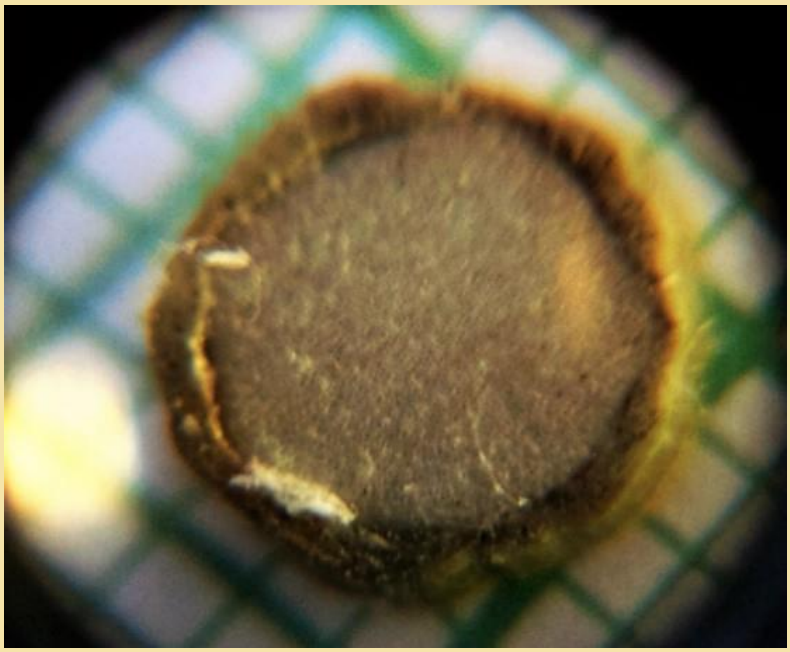


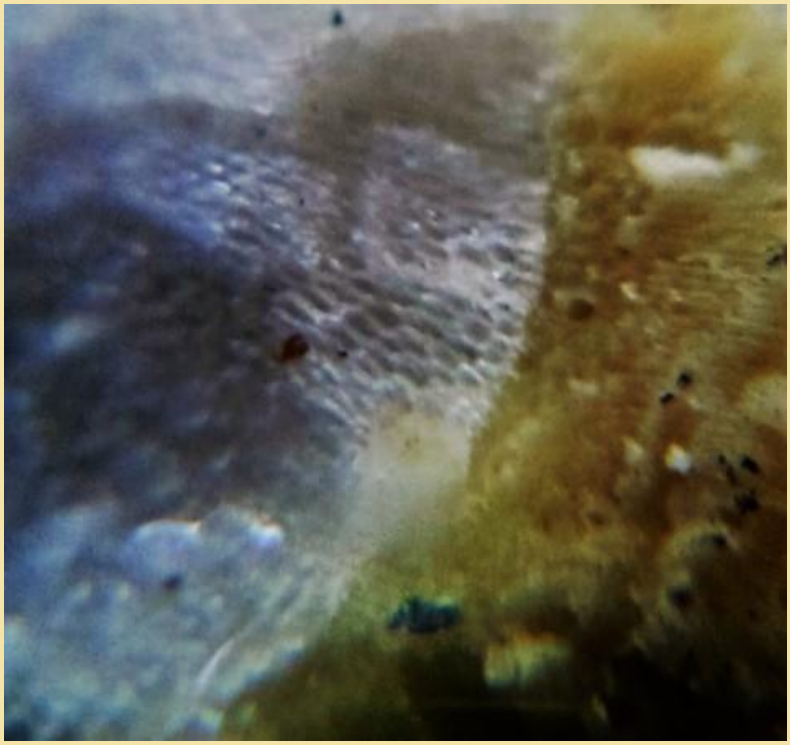
Tapioca stem 10 days after New Moon – Completely affected with fungus and shrinks ¼ th of it's size.

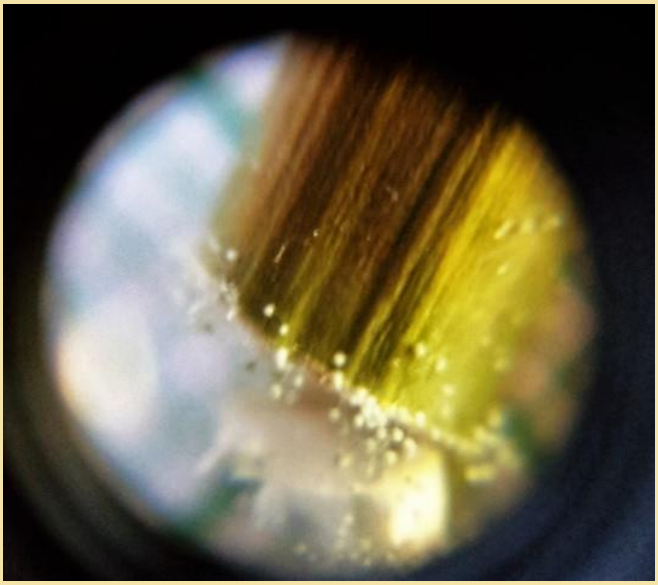
Tapioca stem collected after New Moon - Presence of pests



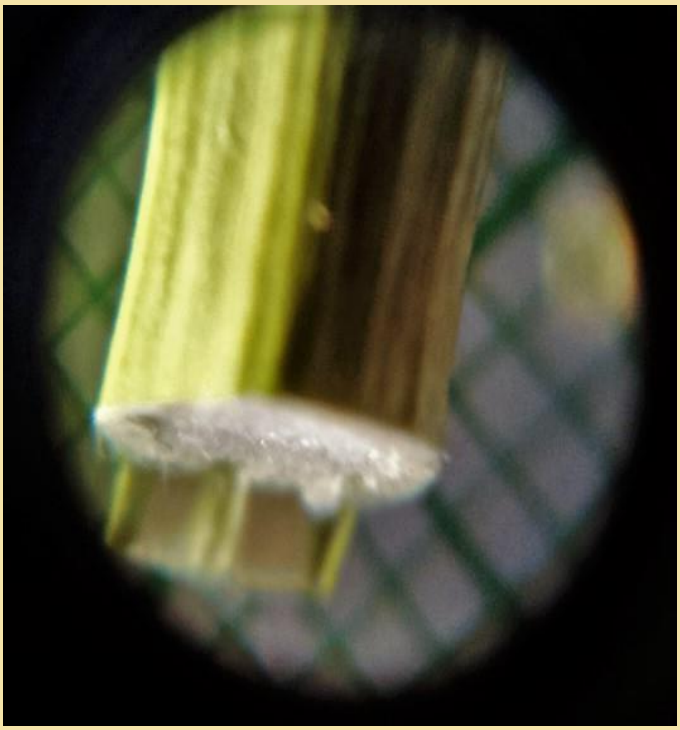
Tapioca stem collected 10 days after Full Moon – No fungal infection and change in size





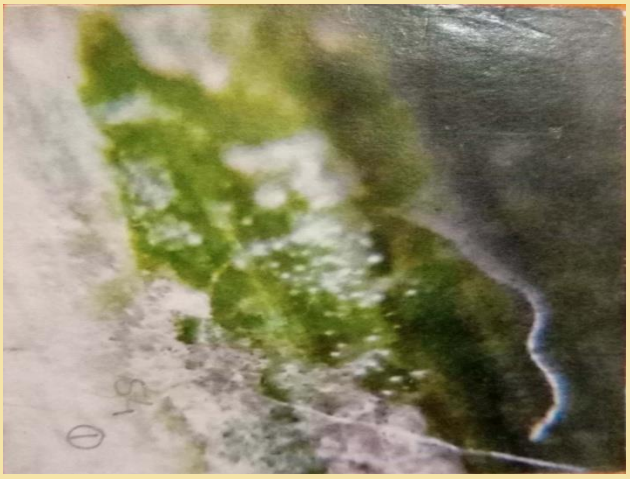


Tapioca stem collected 2 days after New Moon affected with fungus



Tapioca stem collected 2 days after Full Moon – Fungus is not infected.

Tapioca stem 8 days after New Moon



After 12 days

Variation of cell layers through Moon Phases in Eupatorium, Bauhenia & Manihot Utilissima

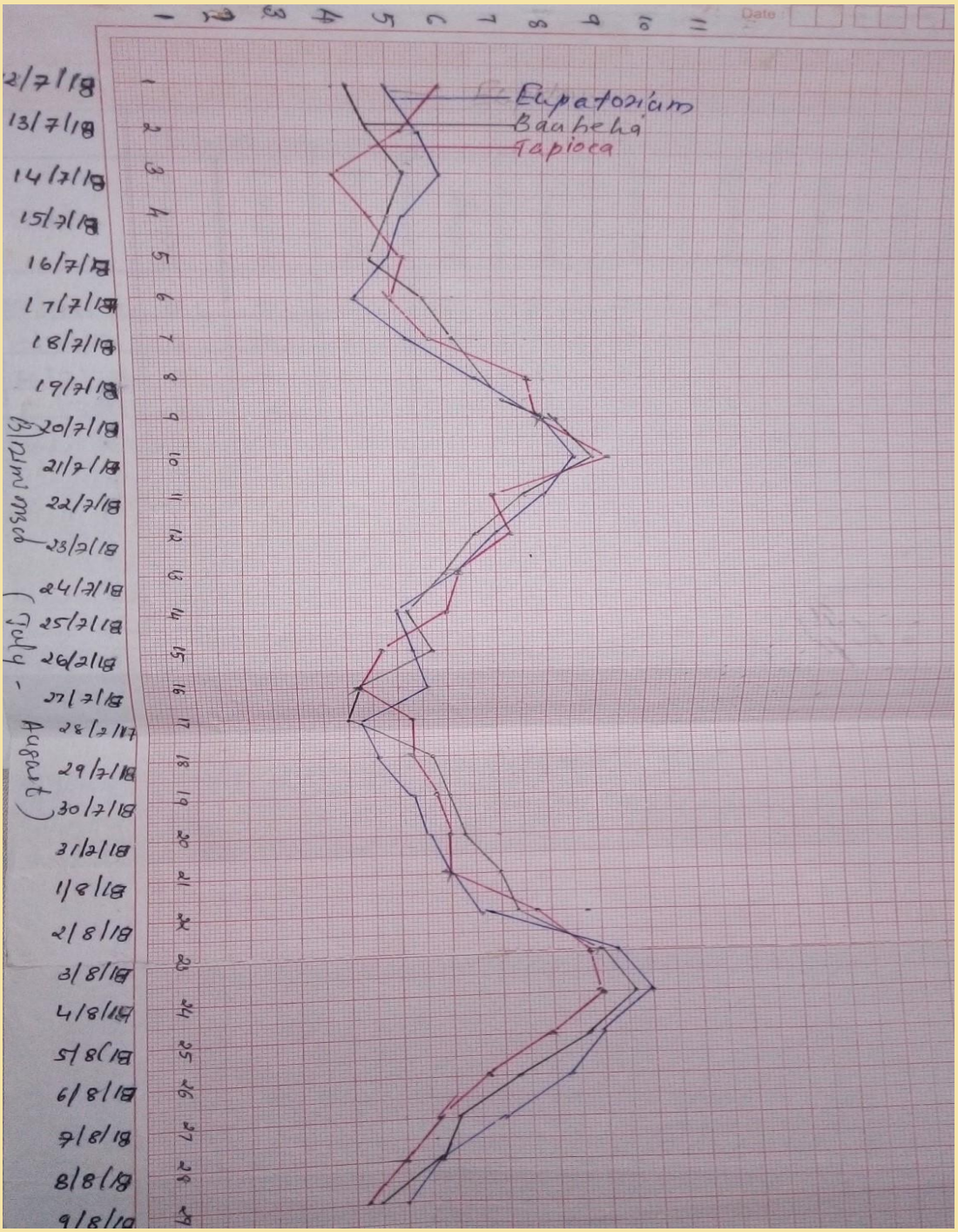


Table showing the variation of cell layers in Eupatorium, Bauhenia & manihot Utilissima from July to August

No	Date	Eupatorium				Bauhenia				Manihot Utilissima			
		Sec1	Sec2	Sec3	Avg	Sec1	Sec2	Sec3	Avg	Sec1	Sec2	Sec3	Avg
1	12/7/18	5	5	5	5	4	5	4	4.33	7	5	6	6
2	13/7/18	6	5	6	5.67	4	5	5	4.67	5	5	6	5.35
3	14/7/18	5	6	7	6	5	5	6	5.35	4	4	4	4
4	15/7/18	5	6	5	5.33	5	5	5	5	5	5	4	5.35
5	16/7/18	4	6	6	5	4	5	5	4.67	6	5	5	5.35
6	17/7/18	4	4	5	4.35	6	6	5	5.67	7	6	5	5
7	18/7/18	5	6	6	5.33	7	6	6	6.33	6	6	5	5.67
8	19/7/18	6	6	7	6.67	7	8	7	7.33	8	8	7	7.67
9	20/7/18	7	8	9	8	9	8	8	8.33	8	7	6	7
10	21/7/18	8	9	9	8.67	10	9	8	9	10	9	9	9.33
11	22/7/18	8	8	8	8	8	7	8	7.67	8	7	6	7
12	23/7/18	7	7	8	7	6	7	7	6.57	7	7	8	7.33
13	24/7/18	6	6	7	6.33	5	7	6	6	6	6	7	6.33
14	25/7/18	4	5	6	5	6	5	5	5.35	5	6	7	5
15	26/7/18	5	5	6	5.35	6	6	5	5.67	5	4	5	4.67
16	27/7/18	4	5	5	4.67	4	4	5	4.35	4	4	5	4.33
17	28/7/18	4	4	5	4.35	4	4	4	4	5	5	4	5.33
18	29/7/18	5	4	5	4.6	6	6	5	5.67	5	6	5	5.33
19	30/7/18	5	5	6	5.33	6	5	7	6	6	5	6	5.67
20	31/7/18	5	6	6	5.67	7	6	6	6.33	6	7	5	6
21	1/8/18	5	6	7	6	7	6	8	7	6	7	5	6
22	2/8/18	6	7	7	6.77	8	7	7	7.33	8	8	7	7.67
23	3/8/18	10	9	9	9.33	9	9	9	9		8	9	8.67
24	4/8/18	9	10	11	10	10	9	10	9.67	8	9	10	9

25	5/8/18	8	9	10	9	9	8	9	8.67	7	8	9	8
26	6/8/18	8	8	9	8.33	7	7	8	7.33	7	6	7	6.67
27	7/8/18	6	8	7	7	6	6	6	6	6	5	6	5.67
28	9/8/18	6	6	5	5.67	5	6	6	5.67	5	5	5	5

Graph Showing Change in Number of cell layers of Eupatorium, Bauhenia & Manihot Utilissima from August to September

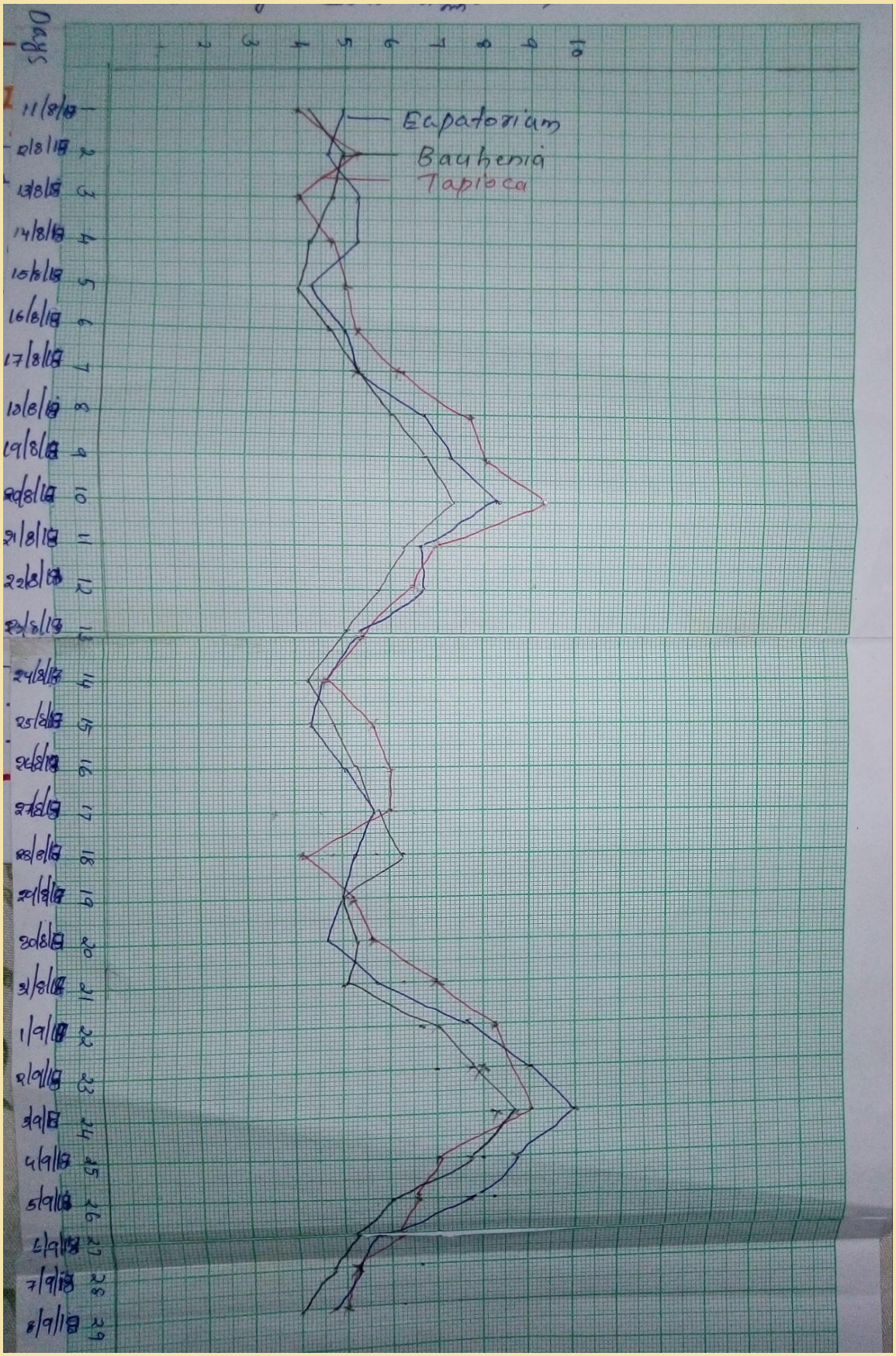


Table showing the variation of cell layers in Eupatorium, Bauhenia & manihot Utilissima from August to September

No	Date	Eupatorium				Bauhenia				Manihot Utilissima			
		Sec1	Sec2	Sec3	Avg	Sec1	Sec2	Sec3	Avg	Sec1	Sec2	Sec3	Avg
1	11/8/18	4	5	6	5	4	4	5	4.35	4	4	4	4
2	12/8/18	5	4	5	4.6	4	5	6	5	6	5	5	5.35
3	13/8/18	5	5	6	5.3	4	5	5	4.67	4	4	4	4
4	14/8/18	5	5	6	5.3	4	4	5	4.55	4	5	5	4.67
5	15/8/18	4	4	5	4.35	4	4	4	4	5	5	6	5
6	16/8/18	4	5	6	5	4	5	5	4.67	5	5	6	5
7	17/8/18	5	6	6	5.35	5	5	6	5.35	6	7	6	6.33
8	18/8/18	7	6	7	6.67	5	6	7	6	8	8	7	7.67
9	19/8/18	8	7	7	7.33	6	7	7	6.77	8	8	8	8
10	20/8/18	6	7	8	8.33	7	7	8	7.33	9	9	10	9.33
11	21/8/18	6	7	7	6.67	6	6	7	6.33	6	8	7	7
12	22/8/18	6	6	7	6.63	5	6	6	5.67	7	7	6	6.67
13	23/8/18	5	5	6	5.3	5	5	5	5	6	5	5	5.35
14	24/8/18	4	5	5	4.6	4	4	5	4.35	5	5	4	4.67
15	25/8/18	4	4	5	4.35	5	4	5	4.6	6	5	6	5.67
16	26/8/18	4	5	6	5	5	6	6	5.33	6	6	6	6
17	27/8/18	5	6	6	5.67	6	5	6	5.67	5	4	5	4.67
18	28/8/18	5	5	6	5.3	6	7	6	6.33	5	5	6	5.35
19	29/8/18	5	5	5	5	5	5	5	5	6	7	6	6.33
20	30/8/18	4	5	5	4.67	5	6	5	5.35	7	7	6	6.67
21	31/8/18	5	6	6	5.67	5	5	5	5	6	7	8	7
22	1/9/18	6	6	6	6	7	7	7	7	9	8	8	8.33
23	2/9/18	8	9	10	9	7	8	7	7.83	8	9	7	8

24	3/9/18	9	10	11	10	9	10	10	8.67	8	8	9	8.33
25	4/9/18	9	10	10	9.67	8	7	8	7.67	7	6	8	7
26	5/9/18	7	8	8	7.67	7	6	5	6	6	6	5	6.67
27	6/9/18	5	6	6	5.35	5	4	5	4.67	5	5	6	5.35
28	7/9/18	5	5	6	5.35	5	5	6	5.33	7	6	6	6.33
29	8/9/18	4	5	5	4.67	4	4	4	4	5	4	6	5

Graph Showing the number of new cell layers

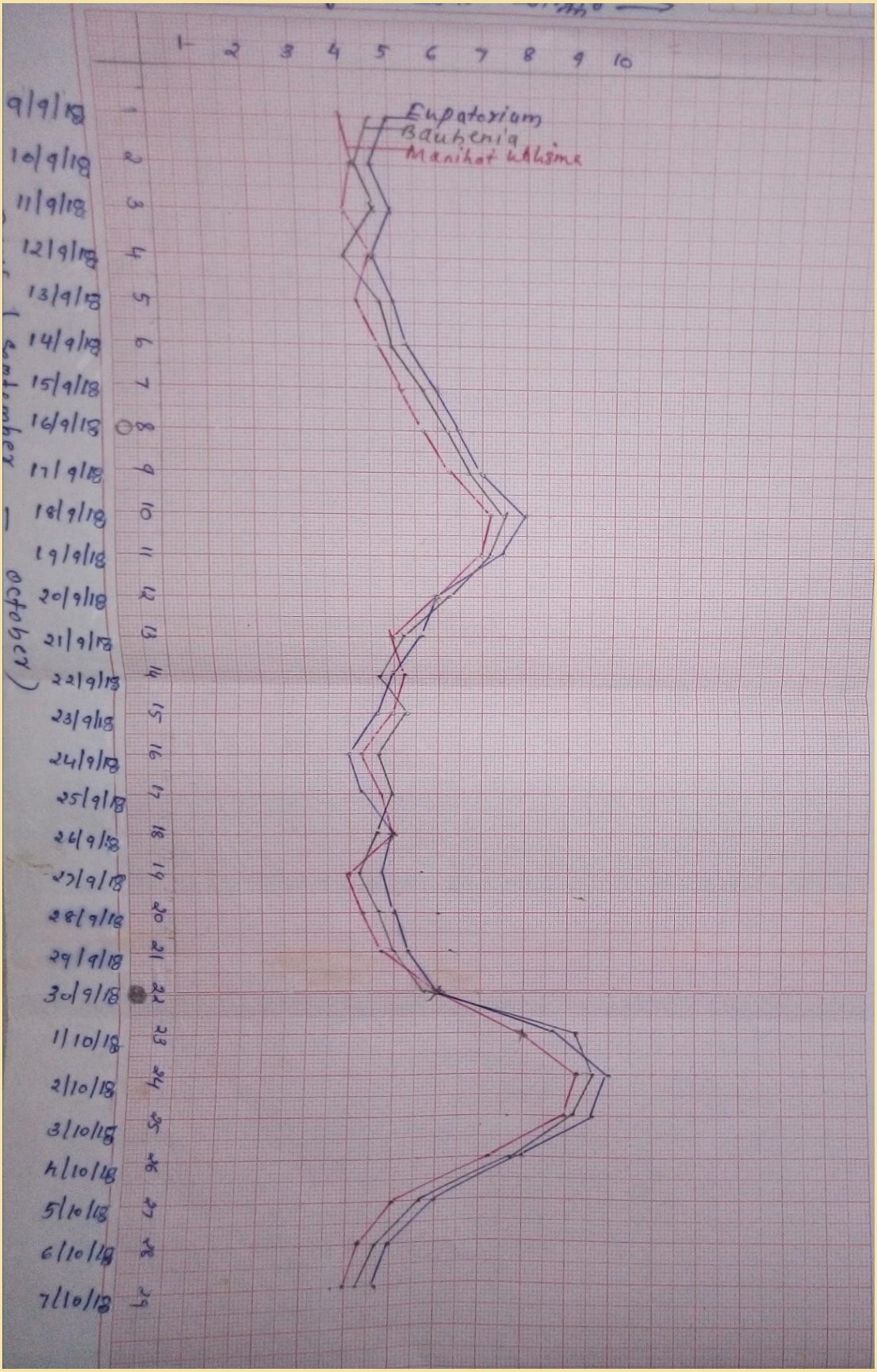


Table showing the variation of cell layers in Eupatorium, Bauhenia & manihot Utilissima from September to October

-

No	Date	Eupatorium				Bauhenia				Manihot Utilissima			
		Sec1	Sec2	Sec3	Avg	Sec1	Sec2	Sec3	Avg	Sec1	Sec2	Sec3	Avg
1	9/9/18	5	5	5	5	4	5	4	4.33	7	5	6	6
2	10/9/18	6	5	5	5.67	4	5	5	4.67	5	5	6	5.35
3	11/9/18	5	6	7	6	5	5	6	5.35	4	4	4	4
4	12/9/18	5	6	5	5.33	5	5	5	5	5	5	4	5.35
5	13/9/18	4	6	5	5	4	5	5	4.67	6	5	5	5.35
6	14/9/18	5	6	5	5.35	5	5	5	5	4	5	5	4.67
7	15/9/18	6	6	6	6	5	5	6	5.67	5	5	6	5.35
8	16/9/18	7	6	7	6.57	6	7	6	6.33	5	6	6	5.67
9	17/9/18	6	7	8	7	7	6	7	6.67	6	6	7	6.33
10	18/9/18	8	8	8	8	7	8	8	7.59	7	8	7	7.33
11	19/9/18	7	8	8	7.57	8	7	7	7.33	7	7	7	7
12	20/9/18	5	6	7	6	6	6	7	6.33	5	6	7	6
13	21/9/18	5	6	6	5.67	6	6	5	5.33	4	5	6	5
14	22/9/18	6	5	4	5	4	4	5	4.33	5	5	5	5.33
15	23/9/18	5	4	5	4.67	5	6	5	5.33	5	5	5	5
16	24/9/18	4	4	4	4	5	4	5	4.67	4	4	5	4.33
17	25/9/18	5	4	5	4.33	5	5	5	5	5	5	4	4.67
18	26/9/18	5	5	5	5	5	4	5	4.67	4	6	5	5
19	27/9/18	5	5	4	4.67	5	4	4	4.33	4	4	4	4
20	28/9/18	4	5	6	5	4	5	5	4.67	4	4	5	4.33
21	29/9/18	5	6	5	5.33	4	5	6	5	4	5	5	4.67
22	30/9/18	6	7	5	6	6	6	5	5.67	6	6	6	6

	Date	Eupatorium				Bauhenia				Manihot Utilissima			
		Sec1	Sec2	Sec3	Avg	Sec1	Sec2	Sec3	Avg	Sec1	Sec2	Sec3	Avg
23	1/10/18	9	8	9	8.67	8	8	9	8.33	7	8	9	8
24	2/10/18	10	9	11	10	10	9	10	9.67	10	9	9	9.33
25	3/10/18	10	9	10	9.67	10	9	9	9.33	10	9	8	9
26	4/10/18	7	8	9	8	8	8	7	7.67	7	8	7	7.33
27	5/10/18	5	6	7	6	6	6	5	5.67	5	5	5	5
28	6/10/18	5	4	5	5	4	5	5	4.67	5	4	4	4.33
29	7/10/18	5	4	5	4.67	5	4	4	4.33	4	4	4	4

Graph Showing Variation in Sap Content

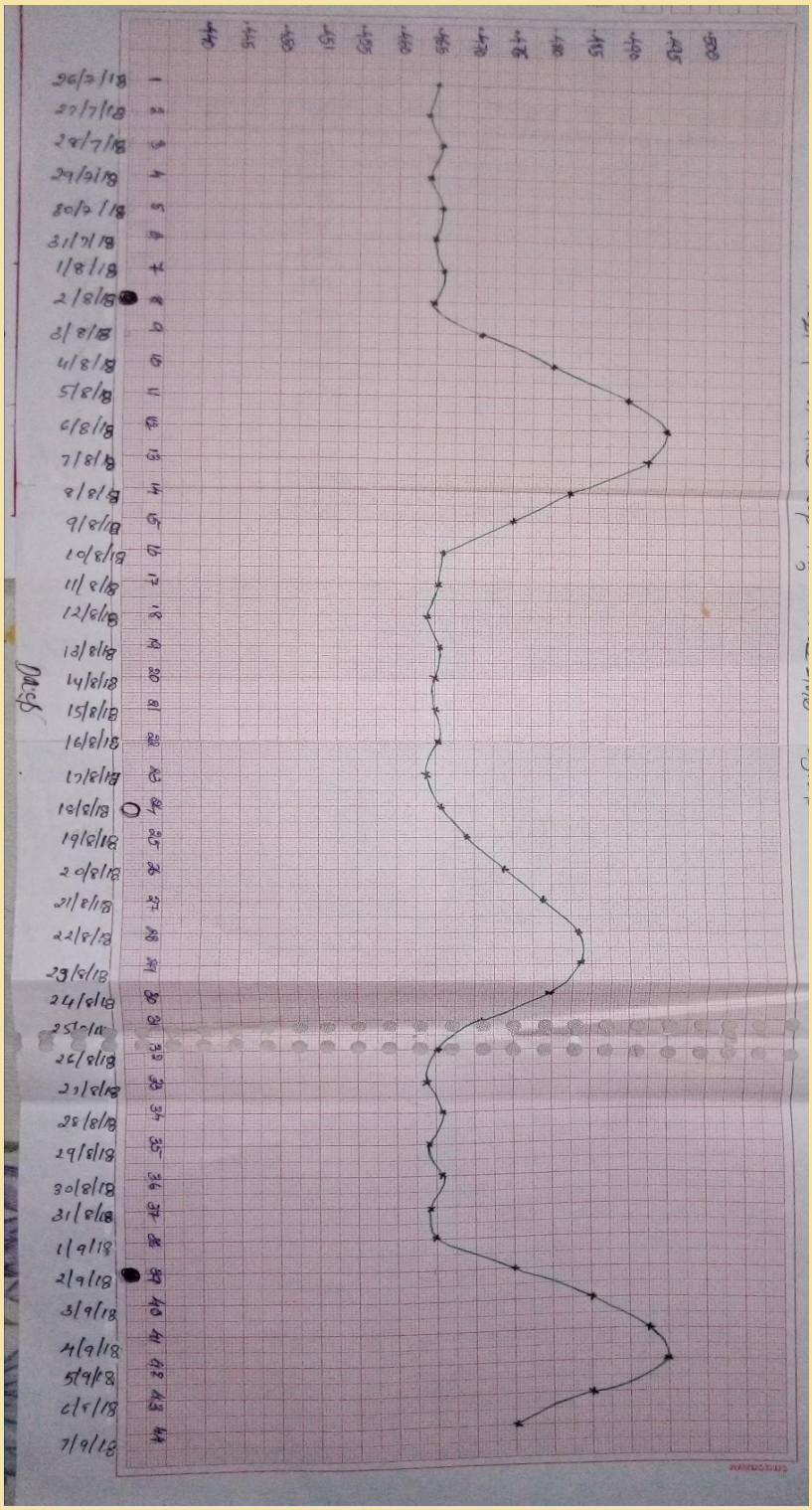


Table showing the variation in sap content of Manihot Utilissima

No	Date	original weight of tissue paper	Weight of tissue paper after collecting sap	Sap content
1	26/7/18	0.440	0.465	0.25
2	27/7/18	0.440	0.465	0.23
3	28/7/18	0.438	0.466	0.28
4	29/7/18	0.441	0.464	0.23
5	30/7/18	0.438	0.466	0.28
6	31/7/18	0.440	0.465	0.025
7	1/8/18	0.440	0.464	0.024
8	2/8/18	0.440	0.472	0.032
9	3/8/18	0.441	0.450	0.039
10	4/8/18	0.440	0.490	0.059
11	5/8/18	0.442	0.495	0.054
12	6/8/18	0.441	0.493	0.054
13	7/8/18	0.439	0.484	0.044
14	8/8/18	0.440	0.475	0.035
15	9/8/18	0.440	0.467	0.026
16	10/8/18	0.441	0.466	0.028
17	11/8/18	0.438	0.464	0.025
18	12/8/18	0.439	0.466	0.028
19	13/8/18	0.438	0.465	0.025
20	14/8/18	0.440	0.465	0.025

21	15/8/18	0.440	0.465	0.025
22	16/8/18	0.440	0.463	0.023
23	17/8/18	0.440	0.466	0.026
24	18/8/18	0.439	0.468	0.29
25	19/8/18	0.440	0.473	0.33
26	20/8/18	0.441	0.478	0.037
27	21/8/18	0.441	0.483	0.042
28	22/8/18	0.440	0.483	0.043
29	23/8/18	0.439	0.479	0.041
30	24/8/18	0.440	0.472	0.037
31	25/8/18	0.440	0.465	0.025
32	26/8/18	0.446	0.464	0.024
33	27/8/18	0.441	0.466	0.025
34	28/8/18	0.440	0.464	0.024
35	29/8/18	0.440	0.466	0.026
36	30/8/18	0.441	0.466	0.025
37	31/8/18	0.438	0.464	0.026
38	1/9/18	0.440	0.465	0.025
39	2/9/18	0.439	0.475	0.036
40	3/9/18	0.441	0.485	0.044
41	4/9/18	0.440	0.493	0.053
42	5/9/18	0.440	0.495	0.055
43	6/9/18	0.439	0.485	0.046
44	7/9/18	0.441	0.475	0.034

Graph showing the variation of capillary rise in soil

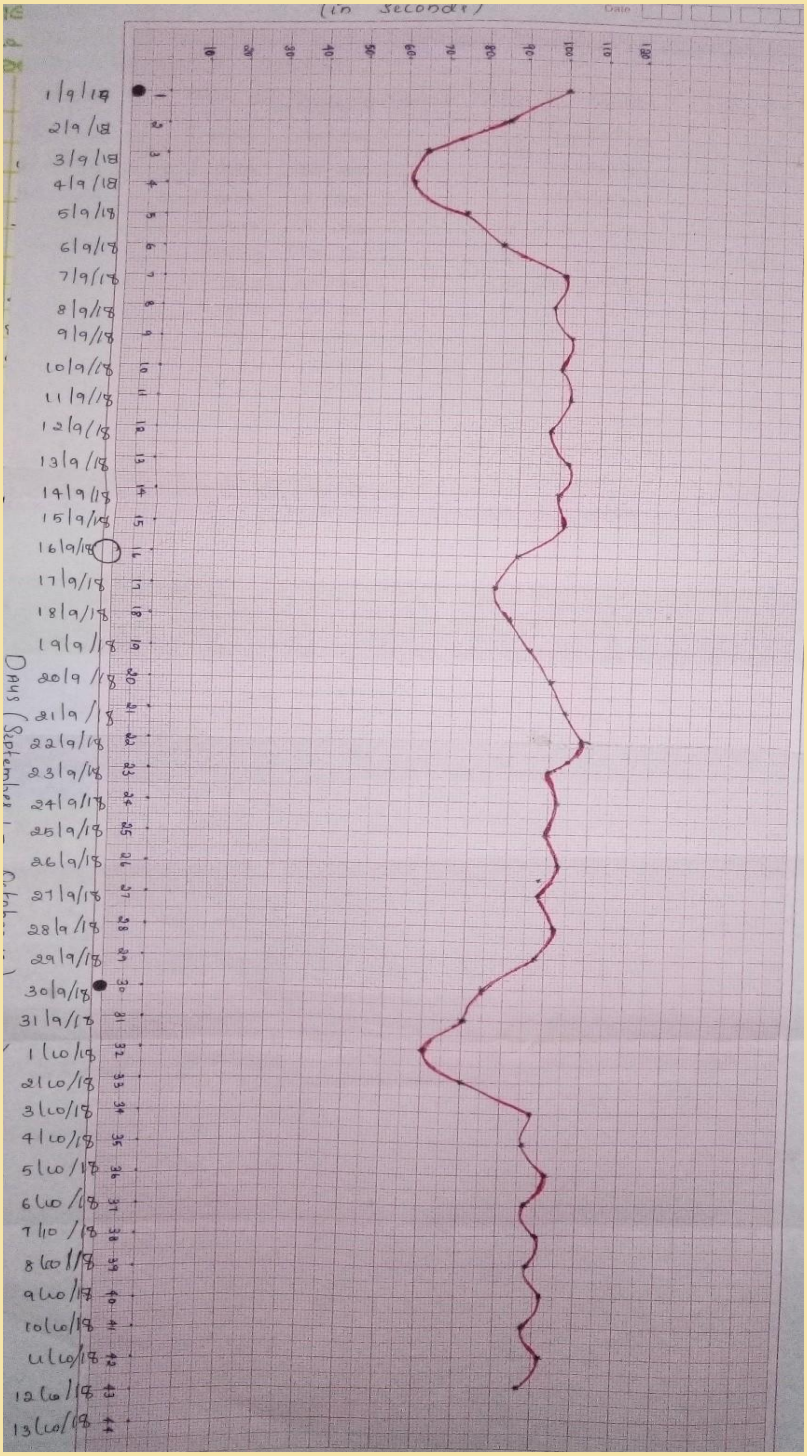


Table showing the variation of capillary rise in the Humidity of soil

No	date	Time for showing moisture content	No	Date	Time for showing moisture content
1	1/9/18	1 min 40 sec	26	26/9/19	1 min 43 sec
2	2/9/18	1 min 25 sec	27	27/9/18	1 min 39 sec
3	3/9/18	1 min 5 sec	28	28/9/18	1 min 44 sec
4	4/9/18	1 min 3 sec	29	29/9/18	1 min 39 sec
5	5/9/18	1 min 15 sec	30	30/9/18	1 min 25 sec
6	6/9/18	1 min 25 sec	31	1/10/18	1 min 20 sec
7	7/9/18	1 min 40 sec	32	2/10/18	1 min 10 sec
8	8/9/18	1 min 38 sec	33	3/10/18	1 min 20 sec
9	9/9/18	1 min 42 sec	34	4/10/18	1 min 39 sec
10	10/9/18	1 min 40 sec	35	5/10/18	1 min 49 sec
11	11/918	1 min 42 sec	36	6/10/18	1 min 42 sec
12	12/9/18	1 min 38 sec	37	7/10/18	1 min 38 sec
13	13/9/18	1 min 41 sec	38	8/10/18	1 min 40 sec
14	14/918	1 min 40 sec	39	9/10/18	1 min 39 sec
15	15/9/18	1 min 43 sec	40	10/10/18	1 min 41 sec
16	16/9/18	1 min 30 sec	41	11/10/18	1 min 38 sec
17	17/9/18	1 min 25 sec	42	12/10/18	1 min 43 sec
18	18/9/18	1 min 29 sec	43	13/10/18	1 min 42 sec
19	1/9/18	1 min 35 sec	44	14/10/18	1 min 38 sec
20	201/9/18	1 min 40 sec			
21	21/9/18	1 min 44 sec			
22	22/9/18	1 min 45 sec			
23	23/9/18	1 min 40 sec			
24	24/9/18	1 min 43 sec			
25	25/9/18	1 min 40 sec			

Identified pests

1. Lyctus Africanus

Light brown or Black coloured pests of 2 to 7 mm long. These were attracted by the sap, lay eggs and the larvae attack sapwood and thus damages the wood completely. They also attack the tender stem of tapioca .

Chlorophorus Annularis

Yellowish Orange in color. 9.5 to 17 mm long. Lays egg in the wood and hatch during favorable situation. The larvae attack the sapwood causing damage to the wood. They were found in plenty on cut wood.

Stromatum Barbatum – Also destroys wood

A common furniture beetle

ANALYSIS

1. **Young farmers are not aware of cultivation based on lunar phases.**
2. **Majority of these young farmers do not consider the traditional knowledge in agricultural field.**
3. **They depend chemical pesticides to control pests.**
4. **Farmers of all age group are unaware of the scientific basis about this traditional knowledge.**
5. **We observed that more ink is spread in xylem tube on the successive days of New Moon**
6. **The sections of Manihot Utilissima taken on 3 – 4 days after New Moon are more subjected to fungus infection and are more porous.**
7. **Usually, 3-4 cell layers are formed In Eupatorium, auhenia and Manihot Utilissima etc; but after 3 – 4 days of New Moon we observed that 8- 10 cell layers are formed in these plants.**
8. **Likewise, the sap content in these plants are usually between 0.020 and 0.030; but we when measured we found that the sap content raises and is between 0.045 to 0.055 on the days after New Moon.**
9. **While measuring the humidity of soil the time taken for reading is higher(20 – 30 seconds) om days after New Moon than ordinary Days.**
10. **Pests like Lyctus Africanus, Chlorophorous Annularis, Strmatum Barbatum etc bore get attracted by the smell of sap, they bore the tender sapwood and lay eggs. They also feed on the sapwood.**

INFERENCES

1. **Due to the notable difference in the number of cell layers of Eupatorium, Bauhenia, Manihot, Utlissima(tapioca) etc in the successive days of New Moon the Sap wood become very thin and soft.**
2. **More sap oozes out when the stem is cut on the days just after New Moon**
3. **On the New Moon day, the Sun and Moon present in the sky the whole day long and due to this the capillary rise of water content is at it's maximum in the soil.**
4. **The increased rate of capillary rise raises the sap water conduction to form new cell layers.**
5. **Due to the smell of sap that oozes out when stem is cut, pests like Lyctus Africanus, Chlorophorus Annularis, Stromatum Barbatum become attracted and chances of pest infestation are more during New Moon.**
6. **As the sapwood is soft and thin the days following New Moon, these pests attack the wood very easily, they breed there causing damage to the wood and the crops like tapioca become not suitable to pant or their growth may become stunted.**
7. **Knowing and Sharing this traditional knowledge backed by science may help young farmers to reduce the use of chemical fertilizers and pesticides and cultivation depending on suitable Moon Phases can maintain a sustainable development in the field of agricuture..**

PROBLEMS AND SOLUTIONS

Till this date no proper studies or researches have done to prove scientifically the cultivation in accordance with Lunar Phases. This was the main problem that we faced while conducting the study because of the non availability of references.

The local farmers depend on certain solutions of their own for pest control while they do cultivation not in accordance with Lunar Phases. This will reduce the use of chemical pesticides. For e.g. the cut end tapioca stem is protected with a layer of mud before planting to prevent the attack of pests.

EXTENDED ACTIVITIES

The attractive forces of the Sun and the Moon are very less compared to the Gravitational Force of the Earth. However these forces cause high tide and low tide. So there is no doubt that these forces have influence on plants and animals. With the inferences and knowledge we gained through this study we plan to conduct more studies - the attractive forces of the Sun and the Moon influence the conduction of water and minerals and to prove scientifically whether there is any force other than cohesion, adhesion, viscous force and root pressure help in the conduction through xylem and phloem in plants. For this we need a well-equipped lab and seek the support and advice of expert scientists.

AKNOWLEDGEMENT

We extend our heartfelt gratitude to all who supported and encouraged us in doing this study, especially to our guide teacher Mr. V R Pyarilal.

BIBLIOGRAPHY

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2. **Moon Phase Harvesting – Journal**
3. **Planting by the Moon – Dr. Randall Frost**
4. **Prevention and Control Wood boring Insects – Holgervelt**

ANNEX

1.SURVEY – QUESTIONAIRE

Name: **Age:**
Gender: Male ☐ **Female** ☐
Address:

1. **Do you Know about Moon Phases?**
   Yes ☐ **No** ☐
2. **Do you depend moon Phases for cultivation?**
   Yes ☐ **No** ☐ **Don't Know** ☐
3. **Have you inherited this knowledge from forefathers?**
   Yes ☐ **No** ☐ **Don't Know** ☐
4. **Do you think it has scientific basis?**
   Yes ☐ **No** ☐
5. **Do the changes of Moon phases adversely affect cultivation?**
   Yes ☐ **No** ☐
6. **Can you overcome such problems using chemical pesticides or fertilizers?**
   Don't Know ☐ **Yes** ☐ **No** ☐
7. **Have you ever tried for it?**

   Yes ☐ **No** ☐

BADGES

All the members, amitha Varma A, Bhavani M Varma, Lakshmi Suresh and Meghna Varma worked as a team while doing the project. In two groups we conducted suveys and interviews. We conducted experiments with the help of our guide and the professor (Dept. of Botany) , st. Thomas College , Pala.

Price hike, less production, attack of pests made made many farmers in our area to give up agriculture. And some used chemicals in excess to over come these problems. This made us to conduct a study on influence of Moon Phases. We believe it will surely make agriculture an interesting experience and eco-friendly.

We conducted the experiments with limited resources available in our locality and as no proper studies are done in this field availability we need advice of epert scients and lab facilities to prove scientifically whether any force other than cohesion, adhesion, viscous force and root pressure influence conduction through xylem and phloem in plants.