SINCE 2010

NAAS Rating
2012:1.3; 2013-16: 2.69
2017-2020: 3.98

IMPACT FACTOR
2019-20: 2.40; 2021:1.09

IPI Value
1.92

Received on:
20th February 2021
Revised on:
18th March 2021
Accepted on:
26th March 2021
Published on:
1st April 2021

Volume No.
Online & Print
134 (2021)

Page No.
21 to 36

Life Sciences Leaflets is an international open access print & e journal, peer reviewed, worldwide abstract listed, published every month with ISSN, RNI Free- membership, downloads and access.

OBSERVATION OF MORPHOLOGICAL CHARACTERISTICS IN *VIGNA RADIATA* USING DRINKING WATER OF DIFFERENT SUBDIVISION OF PATAN DISTRICT

[1] NENSI PATEL, [2]KALPA OZA* AND [3]BHARAT MAITREYA

[2]PH.D. RESEARCH SCHOLAR AND [3]PROFESSOR OF BOTANY DEPARTMENT,

[1,2,3]DEPARTMENT OF BOTANY, BIOINFORMATICS, CLIMATE CHANGE IMPACT MANAGEMENT, GUJARAT UNIVERSITY, SCHOOL OF SCIENCES, AHMEDABAD- 380009, GUJARAT, INDIA.

***Corresponding author's e-mail*: [1]patelnensi8399@gmail.com**

ABSTRACT:

Water quality is inherently linked with human health, poverty reduction, gender equality, food security, livelihoods, and the preservation of ecosystems, as well as the economic growth and social development of our societies [1]. Legumes are next to the cereals in terms of their financial and dietary significances as human meal resources [2]. There is nine sub-division of the Patan District (Patan, Chanasma, Harij, Sami, Sarasvati, Shankheswar, Siddhpur, Radhanpur and Shantalpur). In this research work, we determine how to impact the different drinking water on the plants. Mostly groundwater has high TDS so uptake of nutrients from soil create problem and thus plant can't develop very well. In some sources, plants grow well as branches of Narmada and other sources have law TDS comparison to others and pH around 7.

KEYWORDS: *Legumes, Vigna radiate, Drinking water, Mung bean.*

INTRODUCTION:

Consuming or potable water can be described as a water supply to the

consumers that can be safely used for drinking, cooking, and washing other housework [6]. pH is most important in determining the corrosive nature of water. Lower the pH value higher is the corrosive nature of water. pH was positively correlated with electrical conductance and total alkalinity [3]. Various factors bring about changes in the pH of water. The higher pH values observed suggest that Carbon dioxide, Carbonate-bicarbonate equilibrium is affected more due to change in physicochemical condition [4]. Total dissolved solids (TDS) are naturally present in water or are the result of mining or some industrial treatment of water. TDS contain minerals and organic molecules that provide benefits such as nutrients or contaminants such as toxic metals and organic pollutants. Current regulations require the periodic monitoring of TDS, which is a measurement of inorganic salts, organic matter, and other dissolved materials in water [5]. Mostly subdivisions like Chanasma, Shankheswar, Radhanpur has groundwater sources as used as drinking water. Narmada canal branches provide drinking water in Siddhpur, Sami. Shantalpur and Harij have two types of sources like Narmada canal and groundwater. Potable water is provided from KhanSarovar in Patan and Saraswati river after refining in Sarasvati taluka.

MATERIALS AND METHODS:

Experimental plants

One Leguminous plant was selected for the present study because this one crop is widely used as pulse in this study area.

Vigna radiate

(Binomial Name: *Vigna radiate* (L.)R. Wilczek)

Collection of water sample:-

Samples of water from the sampling sites (drinking water of different subdivisions of Patan) were collected and stored in plastic bottles or closed containers. The bottles were thoroughly cleaned and rinsed with distilled water before collection. The collected samples were labeled properly. Collection and analysis were done in 15 days (1st January 2021 to 15th January).

Preparation of Pots:-

For the experiment, There are 10 samples of water so one set of experiments is repeat three-time consequently 30 pots were needed. Repetition is required for correct results and security of the experiment. About 10-15 mung bean seeds were sown in each pot and water was given for about 15-20 ml (16th January). This process or method was repeated for up to 8 weeks. During the experiment, development of all the plants, of each plant were carefully observed.

Data analysis:-

In 8 weeks, Root length, shoot length, leaf area, flowering, and fruiting parameter as data analysis were observed during the timing of the experiment. The differences in plant or other character

were remarked in a different sample. Leaf area or their edges were observed also. Flowering and fruiting were shown after 6 weeks or 45 days.

These samples were analyzed for two different physicochemical parameters. In turn, Temperature has an effect on physical, chemical, and biological processes in water bodies and consequently the concentration of many variables. As water temperature increases, the rate of chemical response generally increases together with the evaporation and volatilization of substances from the water. Increased temperature also decreases the solubility of gases in water, such as O_2, CO_2, N_2, CH_4, and others. Groundwater temperature is generally higher than that the atmospheric temperature during winter and lower during summer [4]. Mostly the temperature of this water sample is between 25 °C-27 °C. Parameter studied during present work:-

- pH
- Total dissolved solids (TDS)

Table showing pH and TDS of all water sample

SAMPLE OF WATER	pH	TDS (in ppm)
CONTROL	7.00	250 ppm
SARASVATI	7.40	517 ppm
RADHANPUR	8.58	1090 ppm
PATAN	7.67	821 ppm
SAMI	7.80	921 ppm
HARIJ	7.56	901 ppm
CHANASMA	8.34	1220 ppm
SIDDHPUR	7.27	783 ppm
SHANTALPUR	8.63	1510 ppm
SHANKHESWAR	7.94	1060 ppm

RESULTS:

Table 1: Result after 1st week

SAMPLE OF WATER	WEEK 1 RESULT					
	ROOT LENGTH	SHOOT LENGTH	LEAF AREA	FLOWERING	FRUITING	REMARKS
CONTROL	5 cm	3 cm	0.56	NO	NO	Root length is good. late germination. (6th day)
CHANASMA	2.3 cm	5 cm	0.47	NO	NO	4th-day seed germination and average development.
HARIJ	3.6 cm	5.5 cm	0.52	NO	NO	The shoot length is medium. and average development.
SAMI	3.3 cm	4.5 cm	0.55	NO	NO	3rd-day seed germination.
SIDDHPUR	3.5 cm	5 cm	0.49	NO	NO	3rd-day germination. and average development.
SHANTALPUR	3.5 cm	2.5 cm	0.43	NO	NO	Low development.1/3 seeds germinated.
PATAN	2.5 cm	6 cm	0.54	NO	NO	The pace of development is good. all seeds germinated.
SARASVATI	4.6 cm	4.5 cm	0.48	NO	NO	Late germination.6th day.
RADHANPUR	4.3 cm	3 cm	0.40	NO	NO	All over development is poor. late germination.
SHANKHESWAR	5.3 cm	5.3 cm	0.45	NO	NO	Root length is very good to expect others.

Table 2: Result after 2nd week

SAMPLE NO.	WEEK 2 RESULT					
	ROOT LENGTH	SHOOT LENGTH	LEAF AREA	FLOWERING	FRUITING	REMARKS
CONTROL	4.7 cm	6 cm	1.65	NO	NO	Average development
CHANASMA	3.3 cm	8.5 cm	1.45	NO	NO	Good growth of stem length
HARIJ	4 cm	5.8 cm	1.37	NO	NO	The edges of some leaves fragmented
SAMI	3 cm	8 cm	1.53	NO	NO	Leaf area is developed
SIDDHPUR	4.2 cm	8 cm	1.48	NO	NO	The shoot length is good and progress is good.
SHANTALPUR	2.6 cm	4.5 cm	1.32	NO	NO	Leaf edges burning and leaf area small compare to other
PATAN	2.8 cm	7 cm	1.5	NO	NO	Average development and leaf area are also moderate.
SARASVATI	3.5 cm	5.5 cm	1.56	NO	NO	Plant height is all over okay.
RADHANPUR	3.5 cm	4.3 cm	1.2	NO	NO	Moderate growth and shoot length is short compare to others
SHANKHESWAR	2 cm	7 cm	1.51	NO	NO	Leaf area small compare to all root length is small.

Table 3: Result after 3rd week

SAMPLE OF WATER	WEEK 3 RESULT					
	ROOT LENGTH	SHOOT LENGTH	LEAF AREA	FLOWERING	FRUITING	REMARKS
CONTROL	4.7 cm	7 cm	2.6	NO	NO	All overgrowth rate is good
SARASVATI	2.5 cm	8.5 cm	2.57	NO	NO	No major changes.
RADHANPUR	1.5 cm	6.5 cm	2.43	NO	NO	Mainly Root length is short.
PATAN	3.5 cm	6.3 cm	2.54	NO	NO	Slow growth.
SAMI	2.6 cm	6.4 cm	2.51	NO	NO	No major changes.
HARIJ	3.2 cm	7 cm	2.47	NO	NO	Leaf area deveelop.
CHANASMA	5.5 cm	6 cm	2.49	NO	NO	Slow growth rate. the leaf edge is fragmented.
SIDDHPUR	3 cm	7.5 cm	2.5	NO	NO	The growth rate is good.
SHANTALPUR	2.8 cm	7 cm	2.33	NO	NO	Mostly shoot length is short except for others.
SHANKHESWAR	2 cm	5 cm	2.48	NO	NO	The growth rate is average.

Table 4: Result after 4th week

SAMPLE	*WEEK 4 RESULT*					
	ROOT LENGTH	SHOOT LENGTH	LEAF AREA	FLOWERING	FRUITING	REMARKS
CONTROL	4 cm	8.3cm	NO	NO	3.21	The new leaflet was originated
SARASVATI	4.3 cm	9cm	NO	NO	3.19	All overgrowth rate is good except others also new leaflet was produced.
RADHANPUR	5 cm	6.5 cm	NO	NO	2.87	No major difference in plant height
PATAN	5.5 cm	6.4cm	NO	NO	2.96	Root development is the law.
SAMI	4 cm	7.4 cm	NO	NO	3.04	The thickness of the leaf is increased.
HARIJ	4.5 cm	8.7 cm	NO	NO	3.11	Leaf area is found very more.
CHANASMA	4.8 cm	7.3 cm	NO	NO	2.85	All over good development.
SIDDHPUR	3.3cm	9.3 cm	NO	NO	2.98	The height of the plant is found to be enlarged.
SHANTALPUR	3.5 cm	6 cm	NO	NO	2.82	Law development.
SHANKHESWAR	5.8 cm	6.6 cm	NO	NO	3.00	The growth rate is average.

Table 5: Result after 5th week

SAMPLE OF WATER	WEEK 5 RESULT					
	ROOT LENGTH	SHOOT LENGTH	LEAF AREA	FLOWERING	FRUITING	REMARKS
CONTROL	4.2 cm	11.3 cm	NO	NO	3.98	Newly arrive leaflet are developing
SARASVATI	5.5 cm	9.4 cm	NO	NO	3.92	Their leaves remain green except for others
RADHANPUR	5 cm	7 cm	NO	NO	3.74	Their growth has stalled.
PATAN	4.5 cm	10 cm	NO	NO	3.82	Increase in plant height.
SAMI	3.4 cm	9.6 cm	NO	NO	3.87	No major difference from last week.
HARIJ	2.2 cm	10 cm	NO	NO	3.91	Some leaves became yellow.
CHANASMA	2.5 cm	9 cm	NO	NO	3.76	There was not much difference in development.
SIDDHPUR	3.5 cm	9.5 cm	NO	NO	3.84	The plant is beginning to weaken.
SHANTALPUR	5.4 cm	6 cm	NO	NO	3.21	Some plant become dried
SHANKHESWAR	2.3 cm	8.9 cm	NO	NO	3.77	Growth has stopped and the plant became dead.

Table 6: Result after 6th week

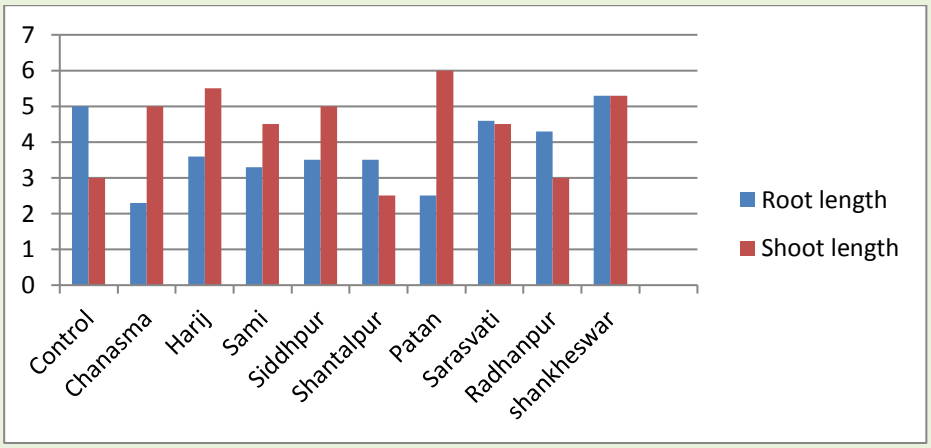
SAMPLE OF WATER	WEEK 6 RESULT					
	ROOT LENGTH	SHOOT LENGTH	LEAF AREA	FLOWERING	FRUITING	REMARKS
CONTROL	4.7 CM	10.3 CM	4.63	NO	NO	There was no much difference in development
SARASVATI	3 cm	10 cm	4.42	NO	NO	All over average growth rate.
RADHANPUR	4.7cm	9.3 cm	4.56	NO	NO	Growth has stalled.
PATAN	4.9 cm	9.1 cm	4.64	NO	NO	Average development.
SAMI	4.8 cm	10 cm	4.61	NO	NO	Some leaves became yellow.
HARIJ	3.9 cm	8 cm	4.79	NO	NO	Development of area of the new leaflet.
CHANASMA	5.3 cm	9.3 cm	4.68	NO	NO	Some leaves have dried up.
SIDDHPUR	4.2 cm	10.1 cm	4.59	NO	NO	Some of the leaves became yellow and law development.
SHANTALPUR	5.2 cm	7 cm	3.24	NO	NO	Some plants have dried up.
SHANKHESWAR	5 cm	7.5 cm	4.12	NO	NO	Most of the plants died

Table 7: Result after 7th week

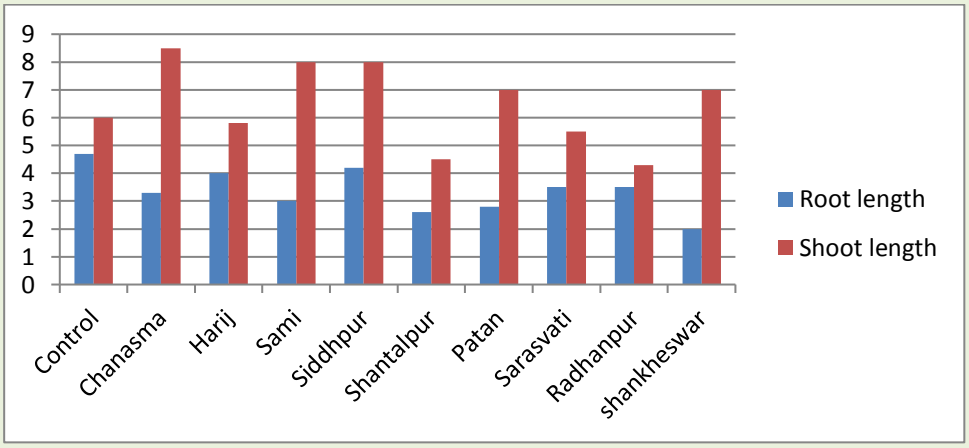
SAMPLE OF WATER	WEEK 7 RESULT					
	ROOT LENGTH	SHOOT LENGTH	LEAF AREA	FLOWERING	FRUITING	REMARKS
CONTROL	7 CM	11 CM	4.65	YES	NO	The very small flower bud has seen
SARASVATI	4.8 CM	10.7 CM	4.50	YES	NO	Remain green except to others.
RADHANPUR	4.6 CM	9 CM	4.52	NO	NO	Mostly plant died.
PATAN	5.8 CM	13.2 CM	4.73	NO	NO	No major difference has been seen
SAMI	6 CM	10.3 CM	4.63	YES	NO	Preparing for the arrival of a small new flower bud.
HARIJ	5.6 CM	9 CM	4.76	YES	NO	All average growth rate.
CHANSAMA	5.3 CM	11.7 CM	4.65	NO	NO	Low growth rate. Plants felt dry.
SIDDHPUR	5 CM	10.5 CM	4.62	YES	NO	Leaf becoming yellow. A new small flower bud has been seen.
SHANTALPUR	2 CM	9 CM	3.27	NO	NO	Plant sap has begun to dry up. leaf becoming dry
SHANKHESWAR	3 CM	8 CM	3.82	NO	NO	Most plants died.

Table 8: Result after 8th week

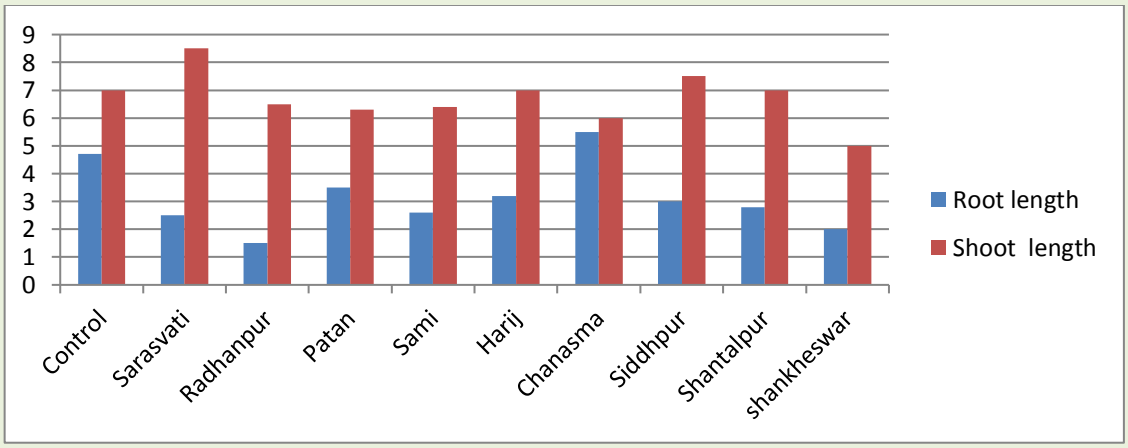
SAMPLE OF WATER	WEEK 8 RESULT					
	ROOT LENGTH	SHOOT LENGTH	LEAF AREA	FLOWERING	FRUITING	REMARKS
CONTROL	5.6 CM	13 CM	4.67	YES	YES	Well, develop flowers and fruit. Other plant leaves become dry.
SARASVATI	3.6 CM	12.5 CM	4.59	YES	YES	All average very good development. Fruit and flower have found.
RADHANPUR	4.8 CM	10.2 CM	3.44	NO	NO	The plant becoming dry and one flower bud has been seen.
PATAN	7 CM	11.7 CM	4.62	YES	NO	3-4 Flower bud have found. Some leaves becoming yellow.
SAMI	4 CM	10.6 CM	3.81	YES	YES	Small fruiting has arrived.
HARIJ	10.3 CM	11 CM	3.85	YES	YES	2-3 Well develop fruiting expect to others.
CHANSAMA	4 CM	11.3 CM	3.86	YES	NO	One flower bud and mostly plant died.
SIDDHPUR	5.3 CM	10 CM	3.34	YES	YES	All over good development.
SHANTALPUR	4.3 CM	7.6 CM	2.81	NO	NO	Most plants dried and died.
SHANKHESWAR	4.7 CM	9.2 CM	3.22	NO	NO	Mostly plant dried and died.



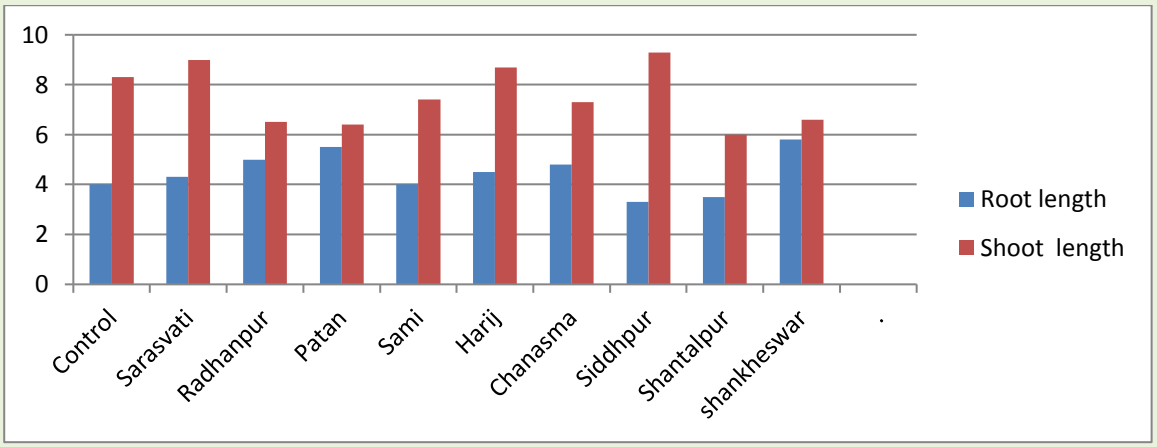
Graph 1: Result after 1st week



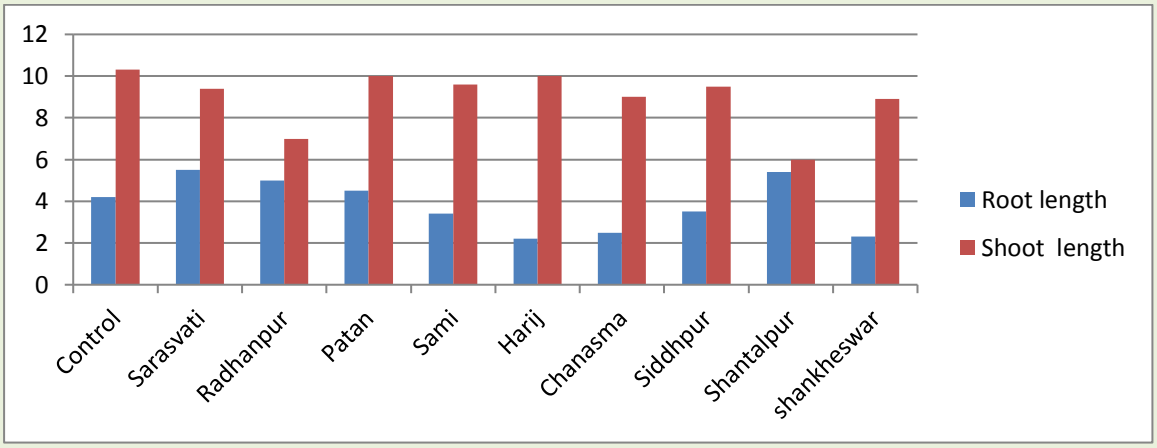
Graph 2: Result after 2nd week



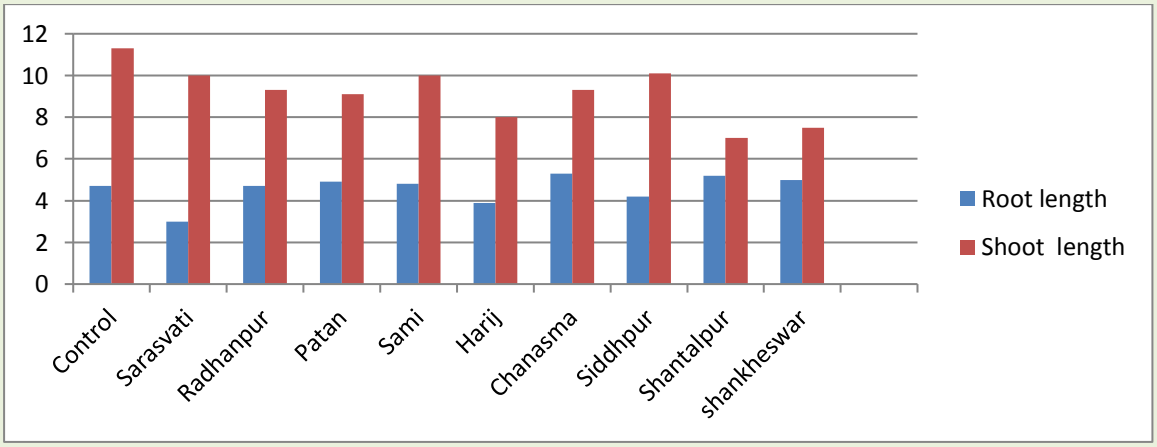
Graph 3: Result after 3rd week



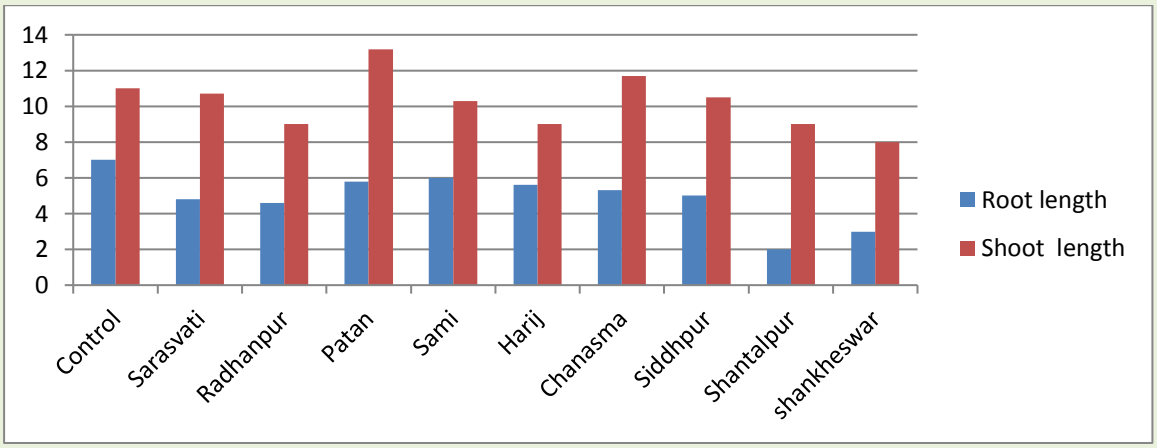
Graph 4: Result after 4th week



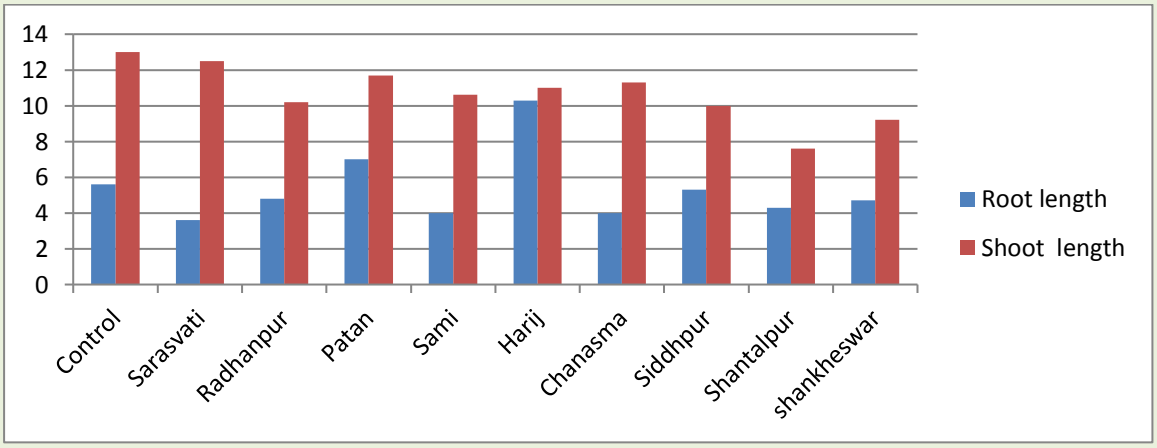
Graph 5: Result after 5th week



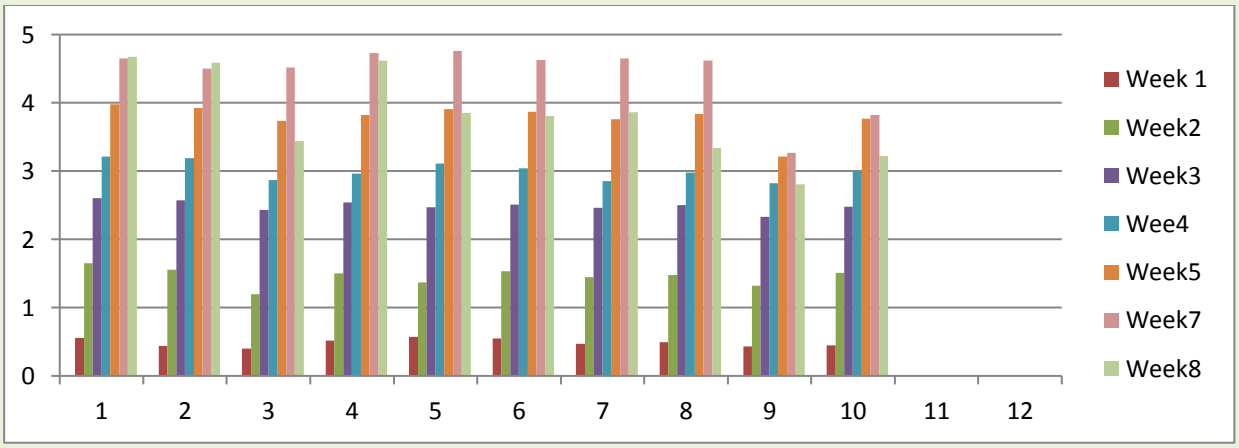
Graph 6: Result after 6th week



Graph 7: Result after 7th week



Graph 8: Result after 8th week



Graph 9: Leaf area of all samples (week 1 to week 8)

(1-control,2-Sarasvati,3-radhanpur,4-patan,5-harij,6-Sami,7-chanasma,8-siddpur,9-shantalpur, 10-shankheswar)

Plate 1: After first week growth of the plant

Plate 2: After eighth week growth of the plant

CONCLUSIONS:

In Mung bean water quality significantly affects the root system, shoot biomass production, and final yield. Suppose that sometimes low TDS water well for plant but if compost is not added to the soil for a plant, the plant get some nutrients from water so some enough level of TDS is good

for the plant. Water quality matters for their development and yield. Groundwater has a high level of TDS and pH therefore the root systems of the vegetation will finally have hassle taking up many of the vitamins we have applied. As drinking water Branches of Narmada distribution have various pH and TDS but that range can beneficial for ornamental plants and kitchen garden.

REFERENCES:

1. Jha, M. K., Shekhar, A., & Jenifer, M. A. (2020). Assessing groundwater quality for drinking water supply using hybrid fuzzy-GIS-based water quality index. Water Research, 179, 115867.

2. Sathe, S. K. (1996). The nutritional value of selected Asiatic pulses: chickpea, black gram, mung bean, and pigeon pea. In Food and feed from legumes and oilseeds (pp. 12-32). Springer, Boston, MA.

3. Patil, P. N., Sawant, D. V., & Deshmukh, R. N. (2012). Physico-chemical parameters for testing of water-a review. International Journal of Environmental Sciences, 3(3), 1194.

4. Karanth, K. R. (1987). Groundwater assessment: development and management. Tata McGraw-Hill Education.

5. Weber-Scannell, P. K., & Duffy, L. K. (2007). Effects of total dissolved solids on the aquatic organism: a review of literature and recommendation for salmonid species. American Journal of Environmental Sciences.

6. DeZuane, J. (1997). Handbook of drinking water quality. John Wiley & Sons.