iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** III **Month of publication:** March 2019

DOI: http://doi.org/10.22214/ijraset.2019.3391

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 7 Issue III, Mar 2019- Available at www.ijraset.com

Effect of Brown Seaweed Extract of Sargassum Johnstonii on Vegetable Plant Growth and Biochemical Constituent

Janvi V. Patel[1], Dr. Nayana Brahmbhatt[2], Himani D. Patel[3], Rinku V. Patel[4], Pooja Thaker[5]
[1, 3]*Institute of Science & Technology for Advanced Studies & Research, Vallabh Vidyanagar-388120, Gujarat, India*
[2 4, 5,] *Department of Biology, V. P. & R. P. T. P. Science College, Sardar Patel University, Vallabh Vidyanagar-388120 Gujarat, India*

Abstract: ***Experiments have been conducted on vegetable plant to take a look at the capacity of brown seaweed of Sargassum johnstonii as a biofertilizer. The effect on growth parameter of germination, root length, shoot length, seedling length, seed vigour index (SVI) and seed stamina index (SSI) of Trigonella foenum-graecum, Corinderum sativumand Spinacia oleracea seeds. In a different concentration seed were treated of seaweed extract of Sargassum johnstonii such as 2%, 4%, 6%, 8%, and 10% and untreated seed used as a control.The biochemical parameter as chlorophyll a, chlorophyll b & total chlorophyll, carotenoid, carbohydrate, and protein were also found in the plant material. The highest seed vigour index (SVI) and seed stamina index (SSI) was obtained when treated with 6% concentration in Trigonella foenum-graecuma, Corinderum sativum and 8% concentration in Spinacia oleracea seeds respectively.***

Keyword: Seaweed extracts Sargassum johnstonii, growth parameters and biochemical constituents.

I. INTRODUCTION

Many farmers are used chemical fertilizer. It is unsafe to human health and effect to the soil, water and air etc. Seaweed extract can use as a best fertilizers for plants. Liquid seaweed extract used for your garden, lawns, flower beds, vegetables or maybe on houseplants[1].

These fertilizers are frequently observed to be more success than chemical fertilizer [2]. Seaweed liquid extract is having an in depth form of beneficial influences, improved uptake of inorganic supplements from the soil, frost and higher seed germination, seedling formation and extended yield and best of plants [3].Seaweed liquid extract as a primer could be promising technique for seeds before germination.

In agricultural practices seaweed extract is mainly applied as soil drench to the developing vegetation. This depends on research paintings on the application and viability of seaweed extract on growth of plant in area. Soil drench application of the Hydroclathrtus liquid extract carried out on Sorghum and discovered maximum percentage increase of growth parameters [4]. Appreciably increased vegetative growth of Lycopersicon esculentum become proven to make use of Sargassum johnstonii extract [5].

Seeds are the maximum important and major part of plant in nature, agriculture and horticulture.This present study, evaluated the effecton germination processusing soaking seeds in distilledwater and in bio-material of seaweeds extract distinction like 2%, 4%, 6%, and 10% concentration percentage germination (laboratory under natural condition) of three vegetables of Trigonella foenum-graecum, Corinderum sativum, and Spinacia oleracea seeds treatment. Analysis of the most potential application of seaweed liquid fertilizer and after biochemical parameters such as chlorophyll-a, b & total chlorophyll, carotenoid, total soluble sugar, and protein by standard method.

A. Collection Of Seaweed Samples

Species of seaweed *Sargassum johnstonii* was collected from Veraval Sea site, Gujarat, India (Longitude-70° 37′E Latitude-20°.53′ N) in the end of December 2018. Hand-picked seaweed washed thoroughly with seawater to remove all the unwanted impurities, adhering sand particles, epiphytes etc.

Then packed it in a bag and transferred to the laboratory. In laboratory the collected seaweeds were again washed with fresh tap water to remove the surface salt and stored it in to water fill bottle.

II. MATERIAL AND METHOD

A. Preparation of Seaweed Extract

The collected fresh seaweeds were dried in sunlight up to three days and grind to make it in the powder form. The powder was mixed with distilled water in ratio of 1:20 (w/v). Boiled for 45 minutes and filtered through of muslin cloth. The filtrate became gathered and saved in to bottle. The filtrate was collected and stored in to bottle. The extract was 100% concentration and in this experiment takes a five different concentration of extract such as 2%, 4%, 6%, 8%, 10% was used.

B. Seeds Collection Of Vegetable Plants

A healthy seeds of three plants Trigonella foenum- graecum, Corinderum sativum and Spinacia oleracea were collected from Anand Agriculture University, Anand, and Gujarat.

C. Seed Soaking

The seaweed extract was prepared with different doses viz., 2%, 4%, 6%, 8%, and 10%. The seeds surface were sterilized with 0.1% $HgCl_2$ up to 1-2 minutes and washed with distilled water immediately then used for different germination. Then the sowing seeds were soaked in particular doses of seaweed extract for 24-48 hours at room temperature. After the seeds from each solution were removed and dried on filter paper for few minutes for controlling moisture content [6].After, seeds were sowed and observed for germination and early growth.

D. Preparation Of Field For Germination Of Seeds

Selected vegetableshealthy 50 seeds primed in each seaweed extract and sawing in enough space in each field. After sawing sprinkle the water for maintaining the moisture content for healthy germination. Seaweed extract applied by soil drench method after 15days, 30 days, 45days and 60days. Seed germination after 15 days, 30 days, 45days and 60daysgrowth parameter like percentage germination, root length, shoot length, seedling length, and seed vigour index (SVI) and seed stamina index (SSI) was measured.

E. Biochemical Constituents

Biochemical parameters such as chlorophyll-a, chlorophyll-b, & total chlorophyll, carotenoid, carbohydrate and protein were measured.The carbohydrate was measured using Anthrone method and protein was measured using Lowry method.

III. RESULT AND DISCUSSION

A. Growth Parameters

In the developing world, the use of seaweed extract should be urged to avoid environmental pollution by heavy doses of chemical fertilizer in the soil. The growth enhancing potential of seaweeds might be attributed to the presence of carbohydrates, macro and micro elements[7]. The maximum percentage of germination turned into recorded 100 % at 4 % advertence for all biopriming agents of Gracillaria corticata J Ag., Kappaphycus alvarezii and its overall extract remedy in brinjal and tomato seed germination [8].In this study, the effect of different concentration of Seaweed liquid extract on growth parameters such as root length, shoot length, seedling length was measured and results discussed below.

B. In Trigonella Foenum- Graecum

The table-1 represented the root length, shoot length and seedling length Trigonella foenum- graecumplant. The maximum root length was observed in 6% concentration of sargassum johnstonii that was 2.26±0.095 cm, 3.80±0.154 cm, 10.65±0.163 cm and 140.6±0129 cm,after 15 days 30 days, 45 days and 60 days, respectively. The maximum shoot lengthrecorded was 13.65±0.152cm, 30.6±0.490cm, 45.1±0.114cm, and 54.15±0.171cm after 15days, 30 days, 45 days, and 60 days in 6% concentration of sargassum johnstonii Seaweed Liquid extract. In the 15, 30, 45, and 60days treatment of Seaweed Liquid extract concentration maximum seedling length observed at 6% concentration was 15.91±0.207cm, 34.4±0.501cm, 55.75±0.237cm and 68.21±0.237cm that were received from Sargassum johnstoniirespectively.

In the 15, 30, 45, and 60 days treatment of Seaweed Liquid extract concentration maximum seed vigour observed (SVI) and seed stamina index at 6% concentration was 1591±20.79cm, 3440±50.17cm, 5575±23.76cm & 6821±23.72cm and 15.91±0.207cm, 34.4±0.501cm, 55.75±0.237cm and 68.21±0.237cm, respectively.

C. In Corinderum Sativum

Higher concentration of Seaweed Liquid Fertilizer, above 6%was found to show retarding effect on shoot & root length (Table 2). In this experiment, in 6% concentration from Sargassum johnstoniithe root and shoot length recorded 15 days, 30 days, 45 days and 60 days were 2.76±0.184cm, 7.44±0.149cm, 7.43±0.126cm & 8.61±2.72cm and 5.33±0.209cm, 15.59±0.193cm, 27.64±0.194cm & 33.3±10.53cm, respectively. In brown seaweed liquid extract most potential Seaweed Liquid Fertilizer was gives highest seedling length 6% was observed in 15, 30, 45, and 60 days was 8.18±0.151cm, 25.76±0.419cm, 35.07±0.292cm & 41.91±13.253cm respectively (Table 2). In the 15, 30, 45, and 60 days treatment of Seaweed Liquid extract concentration maximum seed vigour observed (SVI) and seed stamina index (SSI) at 6% concentration was 8180±15.13cm, 2603±24.53cm, 3507±29.27cm & 4191±1325cm and 8.18±0.151cm, 25.76±0.419cm, 35.07±0.292cm & 41.91±13.253cm respectively that were received with treatment of seaweed extract (Table 2).

D. In Spinacia Oleracea.

At 8% concentration, the result was found lowest length of root and shoot that was 15, 30, 45, and 60 days in 3.16±0.122cm, 9.85±0.187cm, 14.37±0.140cm & 19.0±1.89cm and 5.45±0.160cm, 22.19±0.565cm, 32.69±0.264cm & 37.43±0.209cm, from the Seaweed Liquid extract prepared from Sargassum johnstonii respectively. The lower seedling length was 60 days recorded51.12±0.883cm that was received at 2% concentration preparedfrom Sargassum johnstonii. The highest seedling length was 60 days recorded in all treatment of Seaweed Liquid Fertilizer at 8% concentration, but in all treatment of Seaweed Liquid Fertilizer the highest value observed was 56.43±1.886cm that was received from spinacia oleracea and in control that was found 51.08±0.187cm. The highest length of seed vigour index and seed stamina index was 60 days recorded 5643±188.6cm and 56.43±1.886cm in 8% concentration of spinacia oleracea(Table 2). The highest seed vigour index and seed stamina index of Trigonella foenum- graecum, Corinderum sativum and Spinacia oleraceain was showed in treatment of sargassum wightii at 6% concentration [9].

TABLE 1: Effect of seaweed extract on growth of *Trigonella foenum graecum*

Concentration of seaweed liquid fertilizer (sargassum johstonii)	Root length (cm)				Shoot length (cm)				Seedling length (cm)				Seed vigour index				Seed Stamina Index			
	15 days	30 days	45 days	60 days	15 days	30 days	45 days	60 days	15 days	30 days	45 days	60 days	15 days	30 days	45 days	60 days	15 days	30 days	45 days	60 days
2%	2.04 ± 0.086	3.77 ± 0.250	9.53 ± 0.138	12.32 ± 0.142	11.43 ± 0.205	28.17 ± 0.813	44.13 ± 0.348	51.91 ± 0.225	13.47 ± 0.220	31.94 ± 0.973	53.66 ± 0.360	63.48 ± 0.273	1347 ± 22.65	3194 ± 97.38	5366 ± 36.07	6348 ± 27.33	13.47 ± 0.220	31.94 ± 0.973	53.66 ± 0.360	63.48 ± 0.273
4%	2.01 ± 0.097	3.73 ± 0.200	9.85 ± 0.180	12.38 ± 0.167	12.56 ± 0.175	27.83 ± 0.645	44.33 ± 0.270	52.73 ± 0.190	14.57 ± 0.158	31.38 ± 0.673	54.18 ± 0.382	65.11 ± 0.216	1457 ± 15.83	3138 ± 67.39	5418 ± 38.27	6511 ± 21.64	14.57 ± 0.158	31.38 ± 0.673	54.18 ± 0.382	65.11 ± 0.216
6%	2.16 ± 0.095	3.8 ± 0.154	10.65 ± 0.163	14.06 ± 0.129	13.65 ± 0.152	30.6 ± 0.490	45.1 ± 0.114	54.15 ± 0.171	15.91 ± 0.207	34.40 ± 0.501	55.75 ± 0.237	68.21 ± 0.237	1591 ± 20.79	3440 ± 50.17	5575 ± 23.76	6821 ± 23.72	15.91 ± 0.207	34.40 ± 0.501	55.75 ± 0.237	68.21 ± 0.237
8%	2.03 ± 0.052	3.78 ± 0.102	9.97 ± 0.134	13.13 ± 0.111	13.15 ± 0.196	29.7 ± 0.339	44.07 ± 0.386	52.85 ± 0.229	15.18 ± 0.169	33.48 ± 0.351	54.04 ± 0.448	65.98 ± 0.199	1518 ± 16.97	3348 ± 35.14	5404 ± 44.86	6598 ± 19.98	15.18 ± 0.169	33.48 ± 0.351	54.04 ± 0.448	65.98 ± 0.199
10%	2.07 ± 0.082	3.71 ± 0.158	9.99 ± 0.058	13.22 ± 0.084	12.54 ± 0.185	28.29 ± 0.615	44.11 ± 0.351	52.80 ± 0.242	14.09 ± 0.443	32 ± 0.652	54.01 ± 0.342	66.02 ± 0.306	1409 ± 44.30	3200 ± 65.26	5401 ± 34.27	6602 ± 30.60	14.09 ± 0.443	32 ± 0.652	54.01 ± 0.342	66.02 ± 0.306
control	2.01 ± 0.082	3.53 ± 0.167	9.36 ± 0.095	12.27 ± 0.192	10.23 ± 0.235	25.72 ± 1.007	42.53 ± 0.195	51.81 ± 0.271	12.24 ± 0.268	29.25 ± 0.993	51.89 ± 0.240	64.72 ± 0.342	12.24 ± 26.80	29.25 ± 99.37	5189 ± 24.03	6472 ± 34.20	12.24 ± 0.268	29.25 ± 0.993	51.89 ± 0.240	64.72 ± 0.342

Result = mean±std

TABLE 2: Effect of seaweed extract on growth of corinderum sativum.

Concentration of seaweed liquid fertilizer (sargassum johstonii)	Root length (cm)				Shoot length (cm)				Seedling length (cm)				Seed Vigour Index				Seed stamina Index			
	15 days	30 days	45 days	60 days	15 days	30 days	45 days	60 days	15 days	30 days	45 days	60 days	15 days	30 days	45 days	60 days	15 days	30 days	45 days	60 days
2%	2.13 ± 0.124	6.61 ± 0.273	7.05 ± 0.083	8.16 ± 2.580	11.43 ± 0.205	17.47 ± 0.273	27.21 ± 0.173	31.9 ± 10.087	7.13 ± 0.261	24.08 ± 0.304	34.26 ± 0.172	40.06 ± 12.668	713 ± 26.17	2408 ± 30.49	3426 ± 17.24	4006 ± 1266	7.13 ± 0.261	24.08 ± 0.304	34.26 ± 0.172	40.06 ± 12.668
4%	2.38 ± 0.156	7.09 ± 0.384	7.11 ± 0.076	8.19 ± 2.589	12.56 ± 0.175	17.28 ± 0.269	27.26 ± 0.339	31.19 ± 10.090	7.36 ± 0.242	24.37 ± 0.319	34.37 ± 0.340	40.01 ± 12.680	736 ± 24.28	2437 ± 31.98	3437 ± 34.06	4001 ± 1268	7.36 ± 0.242	24.37 ± 0.319	34.37 ± 0.340	40.01 ± 12.680
6%	2.87 ± 0.119	7.44 ± 0.149	7.43 ± 0.126	8.61 ± 2.722	13.65 ± 0.152	18.59 ± 0.193	27.64 ± 0.194	33.30 ± 10.530	8.18 ± 0.151	26.03 ± 0.245	35.07 ± 0.292	41.91 ± 13.253	818 ± 15.13	2603 ± 24.53	3507 ± 29.17	4191 ± 1325	8.18 ± 0.151	26.03 ± 0.245	35.07 ± 0.292	41.91 ± 13.253
8%	2.76 ± 0.184	7.32 ± 0.213	7.20 ± 0.069	8.08 ± 2.555	13.15 ± 0.196	18.44 ± 0.330	27.54 ± 0.181	32.06 ± 10.138	7.68 ± 0.338	25.76 ± 0.419	34.74 ± 0.221	40.14 ± 12.693	768 ± 33.80	2576 ± 41.90	3474 ± 22.15	4014 ± 1269	7.68 ± 0.338	25.76 ± 0.419	34.74 ± 0.221	40.14 ± 12.693
10%	2.55 ± 0.103	6.59 ± 0.148	7.15 ± 0.072	8.11 ± 2.564	12.54 ± 0.185	17.33 ± 0.616	27.46 ± 0.127	32.12 ± 10.157	7.02 ± 0.225	23.92 ± 0.684	34.61 ± 0.146	40.23 ± 12.721	702 ± 22.52	2392 ± 68.40	3461 ± 14.68	4023 ± 1272	7.02 ± 0.225	23.92 ± 0.684	34.61 ± 0.146	40.23 ± 12.721
control	2.12 ± 0.135	5.37 ± 0.125	6.86 ± 0.088	7.64 ± 2.415	10.23 ± 0.235	16.16 ± 0.127	26.92 ± 0.135	31.84 ± 10.068	6.89 ± 0.162	21.53 ± 0.225	33.78 ± 0.128	39.48 ± 12.484	689 ± 16.29	2153 ± 22.52	3378 ± 12.88	3948 ± 1248	6.89 ± 0.162	21.53 ± 0.225	33.78 ± 0.128	39.48 ± 12.484

(Result = mean±std)

TABLE 3: Effect of seaweed extract on growth of Spinacia oleracea

Concentration of seaweed liquid fertilizer (sargassum johstonii)	Root length (cm)				Shoot length (cm)				Seedling length (cm)				Seed vigour index				Seed Stamina Index			
	15 days	30 days	45 days	60 days	15 days	30 days	45 days	60 days	15 days	30 days	45 days	60 days	15 days	30 days	45 days	60 days	15 days	30 days	45 days	60 days
2%	2.04 ± 0.086	3.77 ± 0.250	9.53 ± 0.138	12.32 ± 0.142	11.43 ± 0.205	28.17 ± 0.813	44.13 ± 0.348	51.91 ± 0.225	13.47 ± 0.220	31.94 ± 0.973	53.66 ± 0.360	63.48 ± 0.273	1347 ± 22.65	3194 ± 97.38	5366 ± 36.07	6348 ± 27.33	13.47 ± 0.220	31.94 ± 0.973	53.66 ± 0.360	63.48 ± 0.273
4%	2.01 ± 0.097	3.73 ± 0.200	9.85 ± 0.180	12.38 ± 0.167	12.56 ± 0.175	27.83 ± 0.645	44.33 ± 0.270	52.73 ± 0.190	14.57 ± 0.158	31.38 ± 0.673	54.18 ± 0.382	65.11 ± 0.216	1457 ± 15.83	3138 ± 67.39	5418 ± 38.27	6511 ± 21.64	14.57 ± 0.158	31.38 ± 0.673	54.18 ± 0.382	65.11 ± 0.216
6%	2.16 ± 0.095	3.8 ± 0.154	10.65 ± 0.163	14.06 ± 0.129	13.65 ± 0.152	30.6 ± 0.490	45.1 ± 0.114	54.15 ± 0.171	15.91 ± 0.207	34.40 ± 0.501	55.75 ± 0.237	68.21 ± 0.237	1591 ± 20.79	3440 ± 50.17	5575 ± 23.76	6821 ± 23.72	15.91 ± 0.207	34.40 ± 0.501	55.75 ± 0.237	68.21 ± 0.237
8%	2.03 ± 0.052	3.78 ± 0.102	9.97 ± 0.134	13.13 ± 0.111	13.15 ± 0.196	29.7 ± 0.339	44.07 ± 0.386	52.85 ± 0.229	15.18 ± 0.169	33.48 ± 0.351	54.04 ± 0.448	65.98 ± 0.199	1518 ± 16.97	3348 ± 35.14	5404 ± 44.86	6598 ± 19.98	15.18 ± 0.169	33.48 ± 0.351	54.04 ± 0.448	65.98 ± 0.199
10%	2.07 ± 0.082	3.71 ± 0.158	9.99 ± 0.058	13.22 ± 0.084	12.54 ± 0.185	28.29 ± 0.615	44.11 ± 0.351	52.80 ± 0.242	14.09 ± 0.443	32 ± 0.652	54.01 ± 0.342	66.02 ± 0.306	1409 ± 44.30	3200 ± 65.26	5401 ± 34.27	6602 ± 30.60	14.09 ± 0.443	32 ± 0.652	54.01 ± 0.342	66.02 ± 0.306
control	2.01 ± 0.082	3.53 ± 0.167	9.36 ± 0.095	12.27 ± 0.192	10.23 ± 0.235	25.72 ± 1.007	42.53 ± 0.195	51.81 ± 0.271	12.24 ± 0.268	29.25 ± 0.993	51.89 ± 0.240	64.72 ± 0.342	12.24 ± 26.80	29.25 ± 99.37	5189 ± 24.03	6472 ± 34.20	12.24 ± 0.268	29.25 ± 0.993	51.89 ± 0.240	64.72 ± 0.342

(Result = mean±std.)

E. Bio-Chemical Constituent

The biochemical parameters of chlorophyll- a, b and total chlorophyll, carotenoid, protein, carbohydrate content of *Trigonella foenum- graecum, Corinderum sativum, &Spinacia oleracea*of plants were presented in the following figures- 1,2,3,4,5,and 6 respectively which was treated with 6% and 8%concentration of seaweed extract of *Sargassum johnstonii* on 60 days.

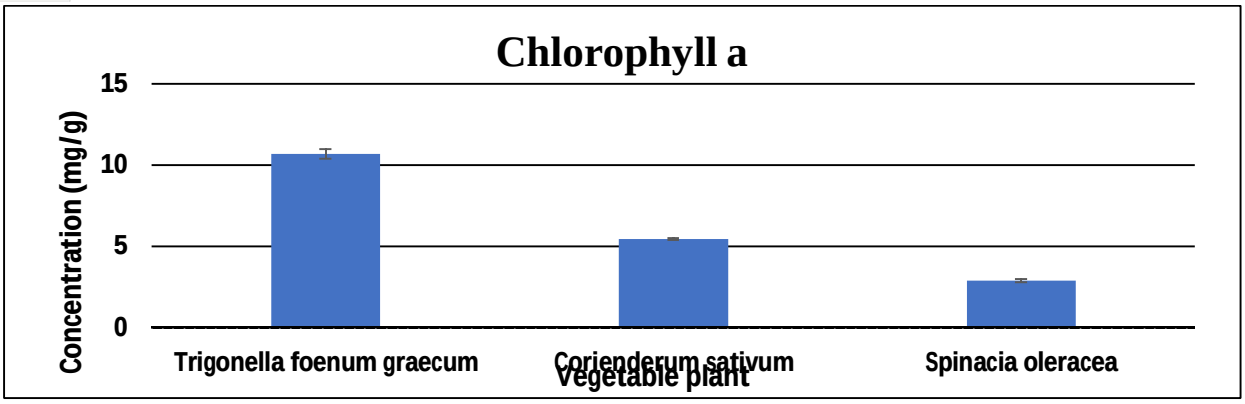


Figure 1: Chlorophyll a content in vegetable plant.

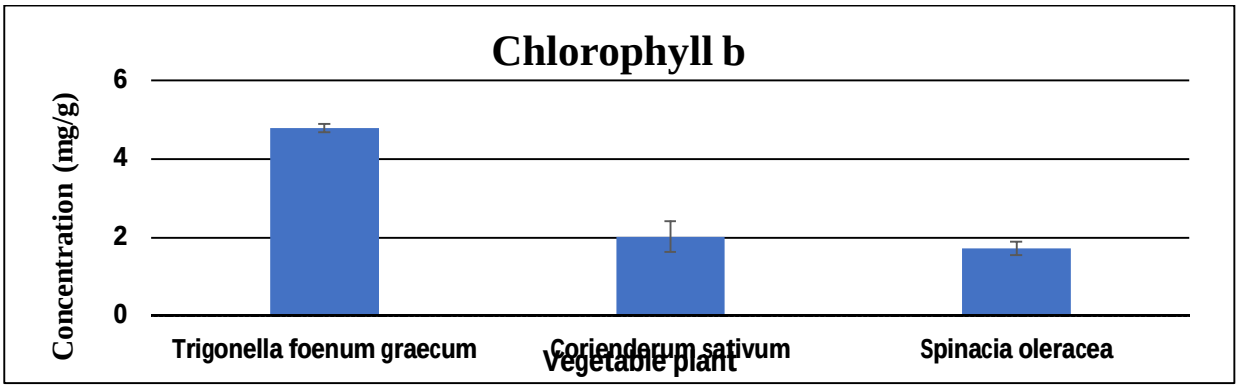


Figure 2: Chlorophyll b content in vegetable plant.

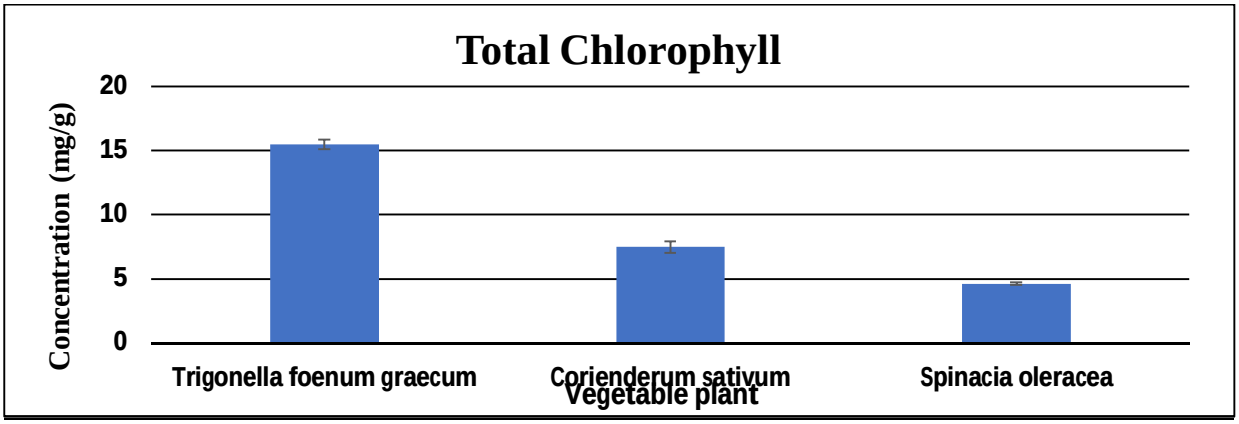


Figure 3: Total Chlorophyll content in vegetable plant.

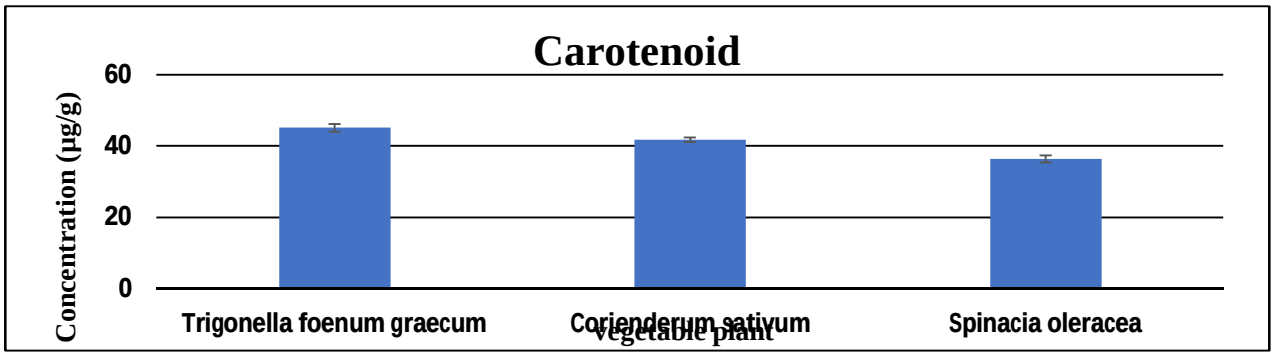


Figure 4: Carotenoid content in vegetable plant.

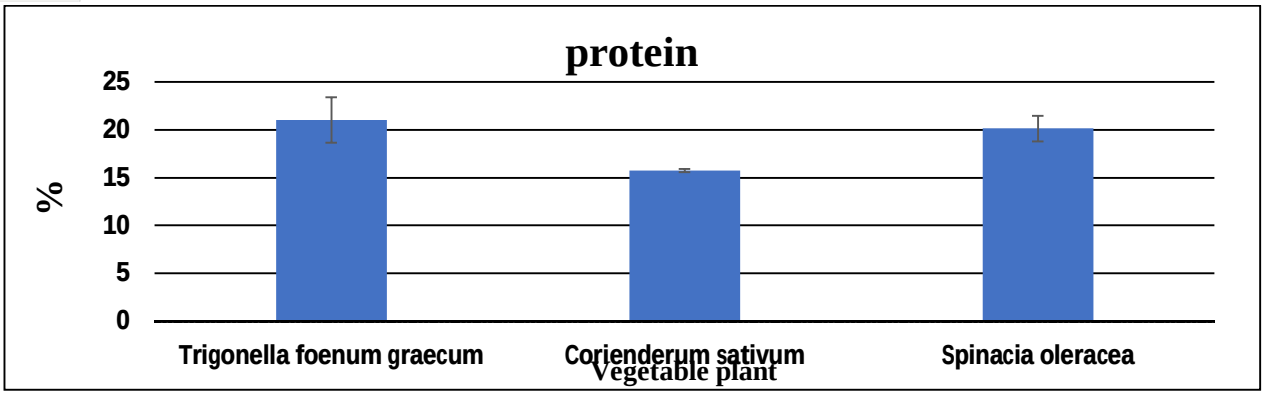


Figure 5: protein content in vegetable plant.

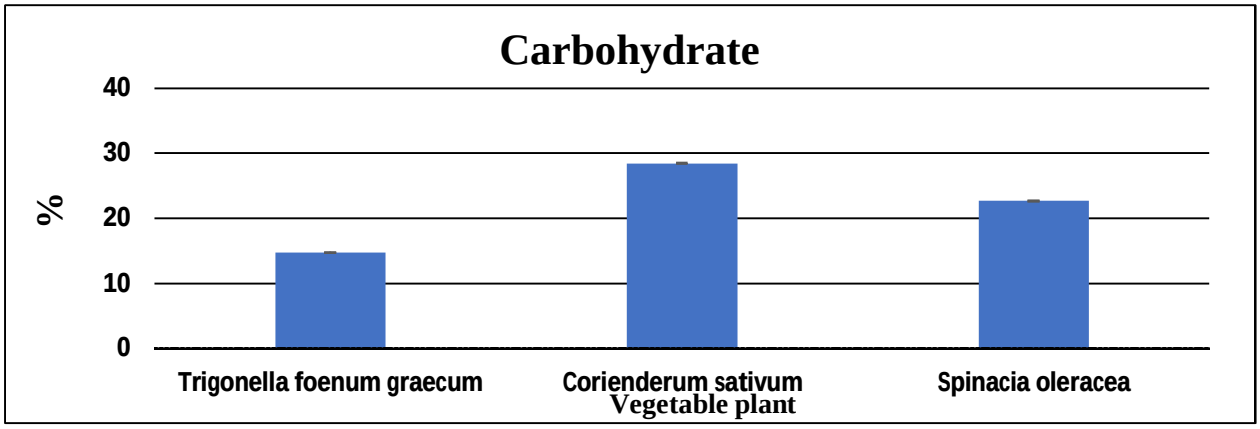


Figure 6: Carbohydrate content in vegetable plant.

The effect of seaweed liquid extract on chlorophyll a, b, total chlorophyll, carotenoid, protein and carbohydrate content, respectively during experimental periods.The chlorophyll a, b & total chlorophyll content Trigonella foenum- graecum, Corinderum sativum, and spinacia oleracea in of 10.6±0.28mg/g, 5.45± 0.077mg/g, 2.88±0.100mg/g; 4.79±0.100mg/g, 2.02±0.388mg/g, 1.73±0.170mg/g and 15.47±0.386mg/g, 7.48±0.462mg/g, 4.62±0.091mg/g, respectively. The carotenoid is most important role in bio chemical perameter. In Trigonella foenum- graecum, Corinderum sativum, and spinacia oleracea plants carotenoid content was after with the treatment of sargassum johnstonii liquid extect which was recorded as 45.16± 1.07µg/g, 41.80±0.59µg/g, and 36.43±0.974µg/g, respectively. In Trigonella foenum- graecum, Corinderum sativum, and spinacia oleracea plants protein and carbohydrate content was treatment of sargassum johnstonii liquid extarct which was recorded as 21.04±2.35%, 15.76±0.18%, & 20.14±1.33 and 14.76±0.029%, 28.46±0.129%, & 22.7±0.103% respectively. The protein content increased with the treatment of seaweed extract of Sargassum johnstonii confirmed the efficiency of soil drench as it enhanced the absorption of most of the necessary elements by the seedlings. The maximum nutrient content of carotenoid, protein, and carbohydrate was shown in brown seaweed liquid fertilizer. Some scientist reported that the beneficed effect of priming in tomato ([10], [11], and [12]), Sunflower[13], maize [14], cowpea [15] and Lentil [16].

IV. CONCLUSION

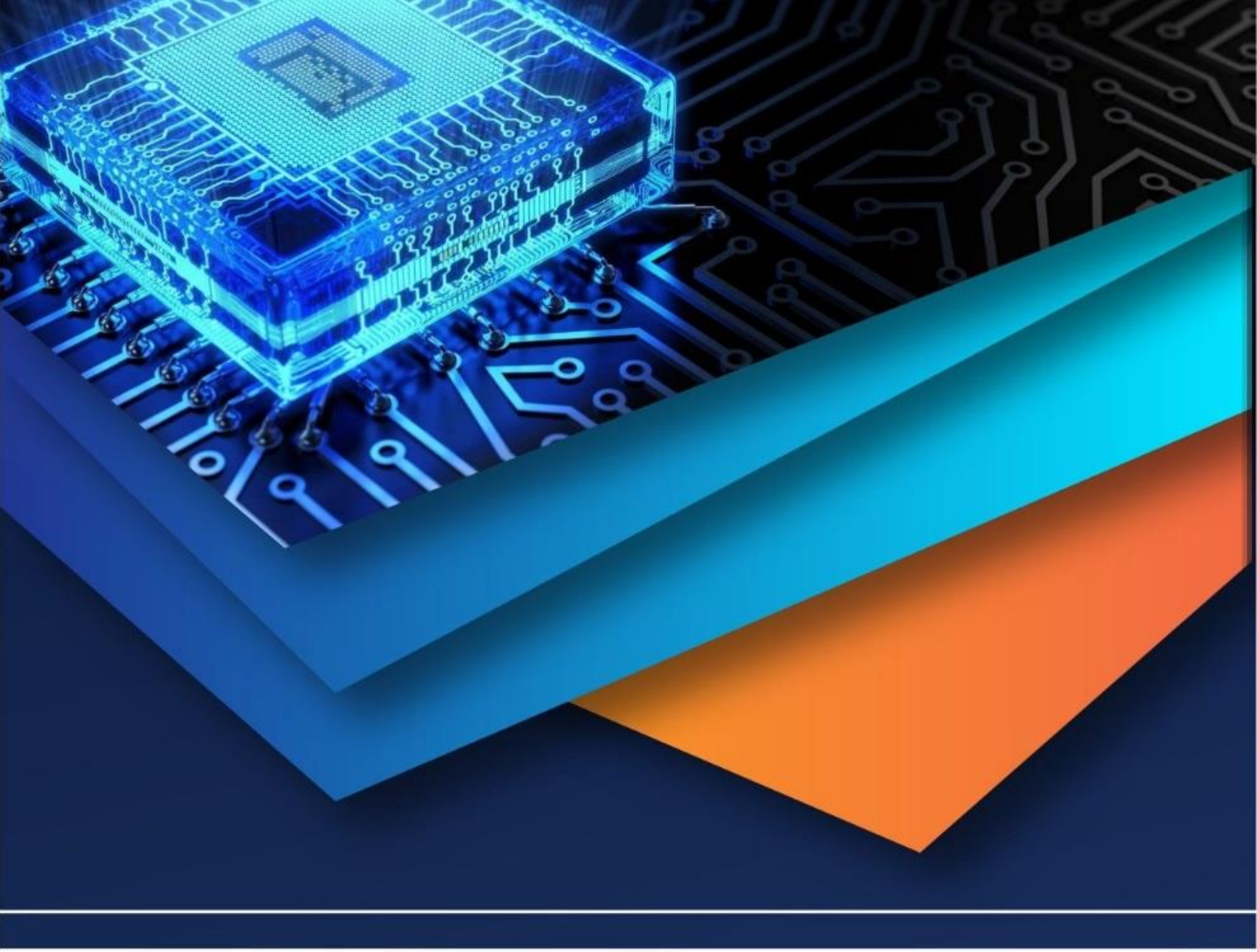
This study showed significant effect of treatments with seaweed extract from Sargassum johnstoniiis used the vegetable plant for improvement of healthy seed germination. Especially, seaweed extract treatment is very cheap, organic, eco-friendly and easily available. Our finding also showed that, Trigonella foenum- graecum, Corinderum sativumandSpinacia oleraceain seaweed extract improve seed germination and growth parameters. The highest results found Trigonella foenum- graecum, Corinderum sativumin 6% concentration and Spinacia oleracea in 8% concentration of all treatments as compare to control. The treatments with seaweed extract from Sargassum johnstonii on bio-chemical parameters of chlorophyll- a, b & total chlorophyll, carotenoid, protein, and carbohydrate content compared to the control. The brown seaweed liquid extract has exhibited on germination and biochemical parameter of growth with better results as compare to other concentration and control.

V. ACKNOWLEDGMENT

I am thankful to Institute of Science & Technology for Advanced Studies & Research (ISTAR), Vallabhvidyanagar for provide labfacility and also thankful for Dr Nayana Brahmbhtt, V. P. & R. P. T. P. Science College, Vallabh Vidyanagar, Gujarat for support and guidance of my dissertation work.

REFERENCES

[1] C. Lawson, the Benefits of Liquid Seaweed Fertilizer (2018).
[2] V.J.Chapman, The marine algae of Fiji. Rev. Algol. N.S. 10:164-171(1971).
[3] G. Blunden, Agriculture uses of seaweeds and seaweed extracts. In: Seaweed Resource in Europe: Uses and potential, Guiry, M.D. and G. Blunden (Eds.). John wiley and Sons, West Sussex, UK, pp: 65-81 (1991).
[4] A.V, Vijayanand N, Rathinavel S. Bio-fertilizing efficiency of seaweed liquid extract of Hydroclathrus clathratus on sorghum vulgare. Seaweed Res Utiln, 26: 181-186 (2004).
[5] R.Kumari, I Kaur, A. Bhatnager. Effect of aqueous extract of Sargassum johnstonii Setchell & Gardner on growth, yield and quality of lycopersicon esculentum Mill. Journal of Applied phycology, 23(3):623-633 (2011).
[6] Bekendam Jan and Grob Regula Hand book for seedling evaluation. International Seed Testing Association, Zurich, Switzerland (1979).
[7] Challen S, Hemingway J. Growth of higher plants in response of feeding with seaweed extracts. In: Proc Fifth Int Seaweed Symp Halifax, 5:359-367 (1965).
[8] R.V. Patel, K. Y. Pandaya, R.T.Jasrai and N. B., Effect of hydro priming and biopriming on seed germination of Brinjal and Tomato seed. Research Journal of Agriculture and Forestry Sciences, 2017, 5(6).1-14.
[9] H. H. Takoliya and R. V. Patel, N. Brahmbhatt, Improving green leafy vegetablesseed germination using bio-priming treatment. International Journal of Recent ScientificResearch Research Vol. 9, Issue, 3(B), pp. 24774-24778, 2018.
[10] S. Khalil, & H.A. Moursy, changes in some germination, morphological, physiological and reproduction characters of heat treatment of seeds. Ain shams University Ann. Agris. Sci 28:1099-1121 (1983).
[11] R. Amoaghaie, K. Nikuzad, B. Shareghi, The effect of priming on emergence and biochemical changes of tomato. Seed under suboptimal temperatures. Seed sci. Technol. 38:508-512 (2010).
[12] R. V. Patel, K. Y. Pandya, R.T. Jasrai, N. Brahmbhatt Efficacy of priming treatment on germination, development and enzyme activity of Allium cepa L. and Brassica oleracea Var Capitata research journal of life sciences,bioinformatics,pharmaceutical and chemical sciences RJLBPCS ISSN 2454-6348 DOI - 10.26479/2018.
[13] M.Hussain, M. Farooq, Basra S.M.A, Ahmad, N. Influence of seed priming techniques on the seedling establishment, yield and quality of hybrids sunflower. Int.J. Agric.Biol. 8(1):14-18(2006).
[14] F.S. Murungu, C. Chiduza, P. Nyamugafata, Clark, L.J., whalley, W.R., Finch- Savage, W.E. Effects of "On –farm seed priming" on consecutive daily sowing occasions on the emergence and growth of maize in semiarid Zimbabwe. Field crops Res.89:49-57 (2004).
[15] A.Singes, Abubakar, A. H., Ahmed,H.G., Aliya, U., Sokoto, M.B., Alhassan, J., Musa, M. and Singh, R.B. seed hydropriming effects on germination, emergence and growth of cowpea (vigna unguiculata L. Walp.). Trendes Adv. Sci. Eng. 1(3):37-42(2011).
[16] S. Saglum, Days. G. Kaya G. and Gurbuz A. Hydro priming increases germination of lentil (lens culinaris medik) under water strees. Not sci. 2(2), 103-106 (2010).
[17] R. V. Patel, K.Y. Pandya, Dr. R.T. Jasrai and Dr. N.Brahmbhatt Scope of utilizing seaweed as abiofertilizer in agriculture, IJAR Article DOI: 10.21474/IJAR01/4941.
[18] R.V. Patel, K.Y. Pandya, R.T. Jasrai andN. Brahmbhatt, Significance of green and brown seaweed liquid fertilizer on seed germination ofSolanum melongena, Solanum lycopersicum and Capsicum annum by paper towel and pot method. International Journal of Recent Scientific Research, 9 (2-E): 24065-24072 (2018).
[19] R.V. Patel, K.Y. Pandya, R.T. Jasrai and N. Brahmbhatt Efficacy of priming treatment on germination, development and enzyme activity of Allium cepa L. and Brassica oleracea var. Capitata. Research journal of Life Sciences, Bioimformatics,Pharmaceutical and Chemical Sciences, 4(2): 55-68 (2018).
[20] R. Kumari, Kaur I, Bhatnagar AK Effect of aqueous extract of Sargassum johnstonii Setchell & Gardner on growth, yield and quality of Lycopersicon esculentumMill. J Appl Phycol, 23: 623-633 (2011).
[21] Abdul-Baki A.A and Anderson J. Vigour determination in soybean seeds by multiple criteria. Crop Sci., 13(6), 630-633 (1973).
[22] A.A. Abdul-Baki and J. D.Anderson Viability and leaching of sugars from germinating barley. Crop Sci, 10, 31-34 (1970).



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY