BIOSPRAY EFFECT OF LEAF EXTRACT OF *Moringa oleifera* AND *Lawsonia inermis* ON GROWTH PARAMETERS AND PHYTO CONSTITUENTS OF *Lycopersicon esculentum*

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ABSTRACT

The present study evaluate the plant growth promoting activity and proximate nutritional analysis of *Moringa oleifera* and *Lawsonia inermis*. The leaf extract of *Moringa oleifera* and *Lawsonia inermis* act as a potential natural growth enhancer as a cheap source of plant growth and development of *Lycopersicon esculentum* plants. The extract can be used in the form of a spray to accelerate the growth of young plants. The combination of both plant leaves extract was well growth on tomato plant. This shows that plant extracts can be used in the major field of plant growth on *Lycopersicon esculentum*. Hence it is recommended to use both plant leaf extract as good fertilizer for plant growth enhancer.

KEYWORDS: Biospray, Plant growth regulators, Seed germination, Biometric analysis, proximate analysis.

INTRODUCTION

Plant growth regulators are organic substances, which in low concentration promote or inhibit growth. Growth regulators are defined as chemical substances which are produced naturally in plants and are capable of translocation and regulating one or more physiological reactions when present in low concentration. Nitrogen, phosphorus and potassium are the most important chemical fertilizers for growth of plants under both in vivo and in vitro conditions. These are essential elements, an essential element is defined as one that is an intrinsic component in the structure or metabolism of a plant growth, development, or reproduction.

Fertilizers come in two types - they are either chemical or bio fertilizers. Bio fertilizers play a very significant role in improving soil fertility by fixing atmospheric nitrogen, both, in association with plant roots and without it, solubilize insoluble soil phosphates and produces plant growth substances in the soil. They are in fact being promoted to harvest the naturally available, biological system of nutrient mobilization.

Bio fertilizers is relatively simple and installation cost is very low compared to chemical fertilizer plants .Bio-fertilizers containing beneficial bacteria and fungi improve soil chemical and biological characteristics, phosphate solutions and agricultural production. Microbiological fertilizers are important to environment friendly sustainable agricultural practices. The Bio fertilizer includes mainly the nitrogen fixing, phosphate solubilizing and plant growth promoting microorganisms.

The use of bio-fertilizers can improve productivity per area in a relatively short time, consume smaller amounts of energy, mitigate contamination of soil and water, increase soil fertility, and promote antagonism and biological control of phytopathogenic organisms.

Chemical fertilizers are important in modern Agriculture, for example, the new high yielding varieties which supply so much of the country’s food, only perform well when they are given

good field management and a balance application of fertilizers. However, in situations where fertilizers are relatively cheap, over application becomes a problem rather than being a solution. Using bio-fertilizers that contain different microbial strains has lead to a decrease in the use of chemical fertilizers and has provided high quality products free of harmful agrochemicals for human safety. Recently, the use of organic materials as fertilizers for crop production has received attention for sustainable crop productivity. Organic materials hold great promise as a source of multiple nutrients and ability to improve soil characteristics. Organic sources like farm yard manure (FYM), poultry manure (PM), green manuring and compost etc not supply the organic matters but also increase the fertility status of soil. They provide organic acids that help dissolve soil nutrients and make them available for the plants.

AIM AND OBJECTIVE

The work entitled as **"Plant Growth Promoting Activity and Proximate Nutritional Analysis of *Moringa oleifera* and *Lawsonia inermis*"** was planned as follows:

- To collect the *Moringa oleifera* and *Lawsonia inermis* leaves.
- To preparation of 10% and 20% of *Moringa oleifera* and *Lawsonia inermis* plant leaves extract.
- To analysis the physico chemical properties of the soil.
- To analysis the physico chemical properties of leaf powder.
- To preparation of biospray using different concentration of plant extract.
- To analysis the synergistic effect of plant extract.
- To study the biometric properties such as root length, shoot number of leaves, plant height, wet weight and dry weight.
- To determine the Qualitative phytochemical and Quantitative phytochemical analysis.

MATERIALS & METHOD

Seed collection for crop study:

Tomato (*Lycopersicon esculantum*) seeds were collected from Brough road, Erode. Seeds were washed with running water and planted into soil.

Collection of soil:

Soil samples were collected from garden land, without stones and hard materials. This finely powdered soil was used for our study.

Collection of plant material:

The plant material such as *Moringa oleifera* and *Lawsonia inermis* (Leaves) were collected from surrounding areas of Erode. The leaves were made in a fine powdered. This powdered was used for further studies.

Preparation of *Moringa oleifera* and *Lawsonia inermis* extracts:

10 and 20 grams of pulverized leaves were weighted and put in a one liter measuring flask, which was left to soak for 1 hour, after which contents were filtered on a sieve and the final volume of the extract was restored to one liter. The extracts were keep in room temperature for further use. Extracts were sprayed weekly once and normal tap water served as a control. The experiment consisted of the following treatments.

Physico-chemical analysis:

Physico-chemical characteristics were carried out for Soil and plant leaves.

Calcium and Magnesium:

A suitable aliquot of the sample was taken. 2ml of NaCl solution was added to produce a pH of 12-13 and mixed well by swirling the flask. 1 tablet of ammonium purpurate was added and titrated immediately with EDTA to the proper end point, with ammonium purpurate, the color change was observed from pink to purple.

Calculation:

If the EDTA titrant is exactly 0.02N,

$$\text{Mg/l calcium+ magnesium} = \frac{\text{ml.EDTA titrant x 1 x 1000}}{\text{ml.sample taken for estimation}}$$

Magnesium calculation:

Mg/l magnesium (as $CaCO_3$) =mg/l total hardness (as $CaCO_3$) – mg/l Calcium hardness (as $CaCO_3$)

A suitable aliquot of the sample was taken.2.0ml of ammonium buffer solution was added to produce a pH of 12-13 and mixed well by swirling flask.0.1g of Erichrome black T indicator was added and titrated immediately with EDTA to the proper end point, with Erichrome black T indicator, the colour change was observed from pink to purple.
If the EDTA titrant is exactly 0.02N,

$$\text{Mg/l calcium + magnesium} = \frac{\text{ml.EDTA titrant x 1 x 1000}}{\text{ml.sample taken for estimation}}$$

Chloride:

100ml of the sample or an aliquot containing not more than 10mg.chloride was taken in a porcelain basin of about 500ml capacity (if the pH of the sample is in the range of 7 to 8 it can directly be titrated. If the pH is not within this range, the pH was adjusted to be within this range using sulphuric acid or sodium hydroxide solution and diluted to 100ml with

distilled water). 1ml of potassium chromate indicator solution was added and titrated against standard silver nitrate solution with constant stirring until a slightest perceptible reddish coloration persisted. A blank was prepared by placing 100ml chloride-free distilled water instead of sample. A blank of 0.2 to 0.3 ml was usual for the method.

Calculation:

$$\text{Mg/l chloride (as } Cl^-) = \frac{\text{ml. } AgNO_3 \text{ for sample} - \text{ml.} AgNO_3 \text{ for blank x 1 x 1000}}{\text{ml.sample taken for determination.}}$$

Phosphate:

100ml or a suitable aliquot of the sample containing not more than 20µg P in a 100ml Nessler tube (the sample should be free from colour and turbidity was taken). 1 drop of phenolphthalein indicator was added. If pink colour appeared, it was destroyed by the addition of 1 or 2 drops of sulphuric acid-nitric acid solution. If more than 5 drops were required, a smaller aliquot was taken, added phenolphthalein and the pink colour was discharged and diluted to 100ml.

Into a series of 100ml Nessler tubes appropriated volumes of phosphate was pipetted out and the working solution was converted to the range up to 20µg P. It was diluted to 100ml including the Nessler tubes containing 100ml distilled water as the blank. To the blank, standards and sample, 4.0 ml of ammonium molybdate solution and 0.5ml stannous chloride solution, were added and mixed after each addition. After 10minutes but before 12 minutes, the colour was measured using a spectrophotometer at 690nm.

A calibration curve was plotted to calculate the number of microorganisms of P equivalent to the observed optical density of the sample. The result was expressed as mg phosphate as per litre of sample.

Total Kjeldhal Nitrogen:

Total Kjeldhal Nitrogen is the sum of ammonia nitrogen and organic nitrogen. The classical Kjeldhal method is used to determine the total nitrogen content.

100ml or an appropriated volume of the sample was taken in a kjeldhal flask. 10ml Conc. Sulfuric acid and 1ml of copper sulphate solution were added. If the organic matter was hard to destroy, 20ml Conc. Sulfuric acid and 5g of potassium sulfate were added with a few beads and boiled under hood, until the solution becomes cleared. Then digested for additional 30 minutes. It was allowed to cool. Phenolphthalein indicator and Sodium hydroxide were added until the solution becomes alkaline. The distillation was started after immersing the tip of the condenser in 50ml boric acid solution in a conical flask. 200ml of the distillate was collected and 0.5ml mixed indicator was added to the distillate. It was titrated against 0.02N sulfuric

acid. The color change was observed from pale green to lavender. A blank was made also, starting from the digestion step to final titration.

Calculation:

$$\text{Mg/l Total kjeldhal nitrogen} = \frac{(\text{ml } 0.02N\ H_2SO_4 \text{ for sample- ml} 0.02N\ H_2SO_4 \text{ for Blank}) \times 0.28 \times 1000}{\text{ml.sample taken for estimation}}$$

Estimation of Iron:

Weight 1ml of sample taken in a flask, 1.0g TCA dissolved in about 100ml of water: acetone (80:20) stir for 10 min. Seal the flack with parafilm and leave in the refrigerator for at least 1-1.5 hr. Centrifuge (3500 rpm) for at least 15min. Transfer supernatants to a 100ml flack. The supernatant make up to 100ml distilled water. Pipette out 1ml of sample add 0.5ml acetate buffer and 0.4ml of 1, 10-phenanthroline.Mix well and color were developed. Read the absorbance at 510 nm. Standard graph was drawn by plotting the concentration of Iron on X axis and optical density on Y axis. From the graph the amount of Ion present in the sample was calculated. (Hana Ali & Omar Dary).

Qualitative Phytochemical Analysis:

1) Alkaloids: (Wangner's test)

Approximately 0.5g of each extract was diluted with 10ml of acid alcohol and heated to boiling, cooled and then filtered by whatman filter paper then added 2ml of dilute ammonia and 5ml of chloroform. Shaken gently to extract the alkaloidal base, the chloroform layer was extracted with 10ml of Acetic acid and 1ml of wangner'sreagent (1.27g of iodine and 2g of potassium iodide) was added to the resultant extract. Formation of cream or reddish brown precipitate was indicates the presence of Alkaloids.

2) Flavonoids: (Alkaline reagent test)

To 1 ml of test solution, 5 drops of 5% sodium hydroxide was added. An increase in the intensity of yellow colored solution is seen which becomes colorless on the addition of few drops of 2M Hydrochloric acid.

3) Saponins: (Foam test)

5ml of the test solution was taken in a graduated cylinder and shaken well for five minutes. A stable foam was formed.

4) Tannins: (Ferric Chloride test)

To 2ml of test solution, few drops of 5% ferric chloride solution were added. The blue color indicates the presence of hydrolyosabletannis, while the green color indicates the presence of condensed tannins.

5) Terpenoids: (Salkowski test)

Approximately 2mg of dry extract was shaken with 1ml of chloroform and few drops of concentrated sulfuric acid was added along the sides of the test tube. Formation of red brown color at the interface indicates the presence of terpenoids.

6) Glycosides:

1ml of conc. Sulphuric acid was taken in a test tube then 5ml of extract and 2 ml of Glacial acetic acid with 1 drop of ferric chloride was added. Reaction shows formation of blue color.

7) Proteins: (Ninhydrin test)

Few drops of Ninhydrin reagent and 1ml of extract were added. Appearance of blue color indicates the presence of proteins.

8) **Carbohydrates: (Fehlings test)**

1gm of sample was added with 1ml of fehlings reagent and kept in a boiling water bath for 5 minutes. A brick red precipitate indicates the presence of carbohydrates.

9) Steroids:

2ml of acetic anhydride was added to 0.5g of ethanolic extracts, of sample with 2ml of H_2SO_4. The color change was observed from violet to blue or green that indicated the presence of steroids.

10) Quinones:

A small amount of extract was treated with concentrated HCL and observed for the formation of yellow precipitate (or colouration).

Proximate Analysis:

Estimation of Ash:

The total ash content of a substance is the percentage of inorganic residue remaining after the organic matter has been ignited. 2 g of the pulverized Organic and Normal green teas amples was placed in a crucible and ignited in a muffle furnace at 550^{O}C for 6 hours. It was then cooled in a desiccator and weighted at room temperature to get the weight of the ash.

Estimation of Moisture:

The Petri-dish was washed thoroughly and placed in oven to dry. 5g of the sample was then placed in a pre-weighed Petri dish, and then placed in an oven to dry at 105^{O}C for two hours. The dish and dry sample were transferred to a desiccator to cool at room temperature before, being weighed again. The experiments were repeated until constant weight was obtained.

Estimation of Crude Fibre:

5g of the powdery form of each plants were taken 200ml of 1.25% H_2SO_4 were taken 200ml of 1.25% H_2SO_4 were heated for 30 mins and filtered with a Buchner Funnel. The residue was washed with distilled water until it was acid free. 200ml of 1.25% NaOH was used to boil the residue 30 mins, it was Filtered and washed several times with distilled water until it was alkaline free. It was then rinsed once with 10% HCL and twice with ethanol. Finally it was rinsed with petroleum ether three times. The Residue was peel in a cruciable and dried at 105^{o}C in an oven overnight. After cooling in a desiccator, it was ignited in a Muffle Furnance at 550^{o}C for 90 mins to obtain the weight of the ash.

Estimation of Alkaloids:

5 g of the sample was weighted into a 250ml beaker and 200ml of 10% acetic acid in ethanol was added and covered and allowed to stand for 4 hrs. This was filtered and the extract was concentration a water bath to one quarter of the original volume concentrated ammonium hydroxide was added drop wise to the extract until the preparation was complete. The whole solution was allowed to settle and the precipitated was collected and washed with dilute ammonium hydroxide and then filtered. The residue is the alkaloids which was dried and weighed.

Estimation of Flavonoid:

10g of the plant sample was extracted repeatedly with 100ml of 80% aqueous methanol at room temperature. The whole solution was filtered through Whatman filter paper No.42

(125mm). The filtrate was later transferred into a crucible and evaporated into dryness over a water bath and weighed to a constant weight.

Estimation of Protein:

100mg of plant materials (leaf) were weighed and macerated in a pestle and mortar with 10 ml of 20 percent trichloro acetic acid. Homogenate and centrifuged for 15 minutes at 6000 rpm. Then the supernatant was discarded. To the pellet, 5ml of 0.2N NaOH was added and centrifuged for 5minutes. The supernatant was served and made up to 10ml of 0.2 N NaOH. This extract was used for protein estimation.0.3 ml sample was taken from the extraction. 0.3ml 2N NaOH was added and mixed thoroughly, and then kept in a water bath for 10 minutes. After boiling for 10 minutes, cooled at room temperature.3ml of complex reagent was added and waited for 10min. 0.3ml of Folin phenol reagent was added and the mixture was kept in dark for 30 minutes. The sample was read at 660nm in a UV spectrophotometer. Standard graph was drawn by plotting the concentration of BSA on X axis and optical density on Y axis. From the graph the amount of protein presented in the sample was calculated.

Estimation of Carbohydrates:

1.0 g of sample was taken into boiling tubes and hydrolyzed by keeping them in boiling water bath for 30minutes to 1 hr with 5ml of 2.5 N HCL. It was cooled to room temperature and neutralized with solid sodium carbonate until the effervescence ceases and made up the volume to 100ml and centrifuged.0.5ml and 1ml of the supernatant were collected and used for further analysis. The volume was make upto 1.0ml in all the tubes including the sample tubes by the addition of distilled water.4ml of 0.2% Anthrone reagent was added to each test tube followed by heated in a boiling water bath for 10minutes.Test tubes were cooled at room temperature. Dark green color was appeared on heating the samples. The optical density (OD) value of the colored solution was then measured through 630nm wavelength in a colorimeter against blank. Standard graph was drawn by plotting the concentration of Glucose on X axis and optical density on Y axis. From the graph the amount of carbohydrate present in the sample was calculated.

Chlorophyll Analysis:

Five hundred mg of fresh leaf material was ground with a morder and pestle with 10 ml of 80 percent acetone. The homogenate was centrifuged at 800 rpm for 15 minutes. The supernatant was saved and the residue was re-extracted with 10 ml of 80 percent acetone. The supernatant was saved and the absorbance values were read at 645 and 663 nm in a spectrophotometer. The Chlorophyll ‘a’, chlorophyll ‘b’content were calculated using the formula and is expressed in mg/ g fresh weight.

$$C_{chl\text{-}a} = 12.7\ A_{663} - 2.69\ A_{645}$$
$$C_{chl\text{-}b} = 22.9\ A_{645} - 4.68\ A_{663}$$

Carotenoids Analysis:

The same plant extract used for chlorophyll estimation was also used for carotenoid estimation. The acetone extract was read at 480nm in a UV Spectrophotometer. The carotenoid content was calculated by using the following formula and it is also expressed in mg/g fresh weight.

$$C_{X+C} = (1000A_{470} – 1.82\ Ca- 85.02\ C_b) / 198$$

Absorbance: A- Ca- chlorophyll a; C_b – chlorophyll b; C_{X+C} – carotenoid content

Biometric Analysis:

Growth parameters:

The effect of different carriers and nutrients on growth and Biomass of the edible Crop *Lycopersicon esculentum* were conducted. Plant growth and Biomass of the edible crop was recorded every 15days upto 30days. *Moringa oleifera* and *Lawsonia inermis* extract were sprayed weekly once.

Experimental design:

Pot 1: Control (Tap water)
Pot 2: *Moringa oleifera* 10%
Pot 3: *Moringa oleifera* 20%
Pot 4: *Lawsonia inermis* 10%
Pot 5: *Lawsonia inermis* 20%
Pot 6: *Moringa oleifera* 10% + *Lawsonia inermis*10%
Pot 7: *Moringa oleifera* 20% + *Lawsonia inermis*20%
Pot 8: *Moringa oleifera* 10% + *Lawsonia inermis* 20%
Pot 9: *Moringa oleifera* 20% +*Lawsonia inermis* 10%

Shoot length:

On the day of final count of the germination test, ten normal seedlings were selected from each treatment and in each replication. The shoot length was measured from the base of primary leaf to base of hypocotyle and mean shoot length was expressed in centimeters.

Root length:

Ten normal seedlings used for shoot length measurement were also used for the measurement of root length. It was measured from the tip of primary root to base of hypocotyle and mean root length was expressed in centimeters.

Plant fresh weight (g):

Plant samples were weighed with the electrical weighing balance and recorded the fresh weight (Saddam *et al.*, 2014).

Plant dry weight (g):

Plant samples were placed in paper bags, these were air dried. After that, the dry weight was weighed with the electrical weighing balance and recorded the dry weight.

RESULT AND DISCUSSION

The application of different rates of *Moringa oleifera* and *Lawsonia inermis* leaf extract and water mixture to the tomato plants at the duration of 30th days. The 10% and 20% of *Moringa oleifera* and *Lawsonia inermis* were individually and synergistically sprayed in Tomato plants in one week intervals, as reading was observed up to 30 days.

Table 1 and figure 1-8 showed the physico chemical properties of the soil. The pH of the soil was 7.0, Total Dissolved Soilds (TDS) content was 1730 mg/g, the total Calcium, Magnesium, Phosphate, Iron, Nitrogen were 260 mg/g, 158 mg/g, 3.00 µg/g, 4.00 µg/g,11.00 mg/g respectively. Mahadevi *et al*., 2016 reported the pH 6.2, TDS 1820mg/g, calcium 280mg/g, Magnisium 168mg/g for soil.

Table 2 showed the result of proximate analysis of dried *Moringa oleifera* and *Lawsonia inermis*. The result indicated that high content of Ash, Moisture, alkaloids content was recorded in *Moringa oleifera* (1.29 mg/g, 4.48 mg/g, 0.73mg/g) and Fibre, Flavanoids were low (0.10mg/g, 1.05mg/g). Chinwe Christy Isitua *et al*., 2015 reported the dried *Moringa oleifera* high content of ash, moisture (11.50%, 6.12%).

Table 3 and figure 1-9 demonstrated the physico chemical properties of the different concentration of 10% and 20% of *Moringa oleifera* and *Lawsonia inermis* were individually and synergistically which was taken for our study. The pH, TDS, phosphate, Iron, calcium, was 6.2, 1190mg/ml, 3µg/ml, 3µg/ml, 430mg/ml and the magnesium, chloride, protein, carbohydrate, nitrogen was 310mg/ml, 111.4mg/ml, 1440µg/ml, 143.2µg/ml, 12.0mg/ml respectively for *Moringa oleifera* 10% Concentration.

Table 4 expressed the qualitative phytochemical analysis. 10 types of phytochemical tests were conducted for 10% and 20% of *Moringa oleifera* and *Lawsonia inermis* were individually and synergistically. It was clearly understandable that the alkaloids, flavonoids, protein, carbohydrate were present in all extracts.

Table 5 and figure 10 demonstrated that the seed germinate for *Lycopersicon esculentum*. 10 seeds were sown identical day in all the 9 pots. The % of germinate was observed in different concentrations of leaves extract compared to control. The maximum

rate of seed germination rate was observed in pot-2 (*Moringa oleifera* 10%). Table 6 and figure11-12 showed the Significant difference in all parameters like plant height, root length, shoot length, number of leaves, branches, plant dry weight and plant fresh weight on 15th day.

Table 6 showed the biometric analysis of *Lycopersicon esculentum*. It was observed that the maximum height, shoot length and root length was achieved in pot-2 (*Moringa oleifera* 10% sparying) and pot-9 (*Moringa oleifera* 20% + *Lawsonia inermis* 10% sparying) in *Lycopersicon esculentum* (18.8cm, 18.6cm, 9.2cm and 18.6cm, 9.5cm, 9.1cm correspondingly) when compared to the control pot-1(Tap water sparing) (10.6cm, 6.0cm, 4.6cm).

Table 6 showed that the fresh and dry weight of the treatment of pot-2 (*Moringa oleifera* 10% sparing) (2.24g, 1.09g) and pot-9 (*Moringa oleifera* 20% + *Lasownia inermis* 10% sparing) (2.40g, 1.04g) when compare to the control pot (Tap water) (0.66g, 0.44g) the highest growth obtained in pot-2 and pot-9.

The maximum number of leaves and branches were registered in pot-2 (*Moringa oleifera* 20% sparying) (28 no's, 6 counting) pot-9 (*Moringa oleifera* 20% + *Lawsonia inermis* 10% sparying) (30 no's, 9 counting) while compare to the control pot-1(Tap water) (17no's, 9 counting) the maximum growth contained in pot-2 and pot-9.

Table 7 and figure 13-14 showed the Significant difference in all parameters like plant height, root length, shoot length, number of leaves, branches, plant dry weight and plant fresh weight on 30th day. It was observed that the maximum height, shoot length and root length was achieved in pot-2 (*Moringa oleifera* 10% sparying) and pot-9 (*Moringa oleifera* 20% + *Lawsonia inermis* 10% sparying) in *Lycopersicon esculentum* (27.8cm, 15.2cm,12.7cm) and (27.1cm, 14.6cm,12.5cm) while compare to the control pot-1(Tap water sparing) (14.2cm,8.0cm, 6.2cm).Maximum Dry and wet weight was observed in pot-2 and pot-9.

Table 7 showed that the fresh and dry weight of the treatment of pot-2 (*Moringa oleifera* 10% sparing) (2.28g, 1.08g) and pot-9 (Moringa oleifera 20% + *Lasownia inermis* 10% sparing) (2.28g, 1.04g) when compare to the control pot-1(Tap water) (1.09g, 0.53g). The maximum number of leaves and branches were registered in pot-2 (*Moringa oleifera* 20% sparying) (27no's, 8counting) pot-9 (*Moringa oleifera* 20% + *Lawsonia inermis* 10% sparying) (34 no's, 9 counting) while compare to the control pot-1(Tap water) (19 no's, 6counting).

Table 8 illustrated the qualitative phytochemical analysis. 10 types of phytochemical tests were conducted for *Lycopersicon esculentum* fresh leaves on 30th day. The maximum phytochemical content present in the pot-6 (*Moringa oleifera* 10% + *Lawsonia inermis* 10% sparying). But alkaloids, flavonoids, protein, carbohydrate were present in all pots.

The chlorophyll and carotenoid content was estimated in *Lycopersicon esculentum* (Table 9). It was understandable that the chlorophyll content of the treatment pot-2 (*Moringa oleifera* 10% spraying) of *Lycopersicon esculentum* (chlorophyll a- 0.59mg/ml, cholorophyll b- 0.67mg/ml, carotenoid-1.25mg/ml) and pot-9 (*Moringa oleifera* 20% + *Lawsonia inermis* 10% spraying) (chlorophyll a- 0.58 mg/ml, chlorophyll b-0.59 mg/ml, carotenoid-1.17mg/ml) were found to be maximum when compared to the other treatments.

The carbohydrate and protein content was observed in *Lycopersicon esculentum* (Table10). It was recognized that the level of total carbohydrate content of the plant *Lycopersicon esculentum* were highly enhanced by the combined with *Moringa oleifera* + *Lawsonia inermis*. Among the diverse treatment, pot-2 (*Moringa oleifera* 10% spraying) (186.60 µg/ml) and pot-9 (*Moringa oleifera* 20% + *Lawsonia inermis* 10%) (160.40 µg/ml) were recorded the highest carbohydrate content compare to the control pot.

From the table 10 it was established that the protein content of the all the treatment was found to be significantly higher when compare to the control pot. Among the treatment pot-2 (*Moringa oleifera* 10% sparying) (1740.00 µg/ml) and pot-9 (*Moringa oleifera* 20% + *Lawsonia inermis* 10% sparying) (1930.00 µg/ml) were found to be highest protein content compare to the other pots.

Table 1: Physico chemical analysis of soil

S.No	Parameters	M-10%	M-20%	L-10%	L-20%	M-10% + L-10%	M-20% + L-20%	M-10% + L-20%	M-20% + L-10%
1	pH	6.20	6.00	4.20	5.10	5.30	5.30	4.80	5.50
2	TDS (mg/g)	1780.00	1342.00	920.00	980.00	1200.00	1420.00	1210.00	1320.00
3	Phosphate (µg/g)	3.00	3.00	3.00	2.00	2.00	4.00	3.00	4.00
4	Iron (µg/g)	3.00	3.00	4.00	2.00	3.00	3.00	4.00	5.00
5	Calcium(mg/g)	460.00	380.00	300.00	240.00	280.00	340.00	290.00	520.00
6	Magnesium (mg/g)	310.00	280.00	260.00	150.00	160.00	240.00	170.00	460.00
7	Chloride (mg/g)	111.40	124.30	138.20	100.20	158.40	131.20	142.80	164.70
8	Protein (µg/g)	1440.00	1420.00	1110.00	990.00	1260.00	1380.00	1310.00	1370.00
9	Carbohydrate (µg/g)	143.20	141.10	138.20	123.60	111.10	101.10	113.10	111.30
10	Nitrogen (mg/g)	13.00	10.00	09.80	10.10	11.60	13.20	11.80	12.00

M-10% indicates *Moringa oleifera* 10%, M-20% indicates *Moringa oleifera* 20%, L-10% indicates *Lawsonia inermis* 10% and L-20% indicates *Lawsonia inermis* 20%, M-10% + L-10% indicates *Moringa oleifera* 10% + *Lawsonia inermis* 10%, M-20% + L-20% indicates *Moringa oleifera* 20% + *Lawsonia inermis* 20%, M-10% + L-20% indicates *Moringa oleifera* 10%+ *Lawsonia inermis* 20%, M-20% + L-10% indicates *Moringa oleifera* 20%+ *Lawsonia inermis* 10%.

Table 2: Proximate nutrient analysis of plant leaves extract

S.No	Parameters	*Moringa oleifera* (mg/g)	*Lawsonia inermis* (mg/g)
1	Ash	1.29	1.10
2	Moisture	4.48	4.36
3	Fibre	0.10	0.12
4	Alkaloids	0.73	0.32
5	Flavanoids	1.05	1.14

Table 3: Physico chemical analysis of plant leaves extract

S.No	Parameters	Soil sample
1	pH	7.00
2	TDS (mg/g)	1820.00
3	Calcium (mg/g)	280.00
4	Magnesium (mg/g)	168.00
5	Phosphate (µg/g)	3.00
6	Iron (µg/g)	4.00
7	Nitrogen (mg/g)	12.00

Table 4: Qualitative phytochemical analysis in leaves extract

S.No	Parameters	M-10%	M-20%	L-10%	L-20%	M-10% + L-10%	M-20% + L-20%	M-10% + L-20%	M-20% + L-10%
1	Alkaloid	+	+	+	+	+	+	+	+
2	Flavanoid	+	+	+	+	+	+	+	+
3	Saponins	+	+	+	+	+	+	+	+
4	Tannins	+	+	-	-	-	+	+	+
5	Terpenoids	-	-	+	+	+	+	+	+
6	Glycosides	-	-	+	-	+	+	+	+
7	Protein	+	+	+	+	+	+	+	+
8	Carbohydrate	+	+	+	+	+	+	+	+
9	Steroids	-	-	+	+	+	+	+	+
10	Quinine	+	+	-	-	-	+	-	-

(+) indicate Positive and (-) indicate Negative

M-10% indicates *Moringa oleifera* 10%, M-20% indicates *Moringa oleifera* 20%, L-10% indicates *Lawsonia inermis* 10% and L-20% indicates *Lawsonia inermis* 20%, M-10% + L-10% indicates *Moringa oleifera* 10% + *Lawsonia inermis* 10%, M-20% + L-20% indicates *Moringa oleifera* 20% + *Lawsonia inermis* 20%, M-10% + L-20% indicates *Moringa oleifera* 10%+ *Lawsonia inermis* 20%, M-20% + L-10% indicates *Moringa oleifera* 20%+ *Lawsonia inermis* 10%.

Table 5: Seed Germination

S.No	No. of Pots	Pots	Base material	No. of seeds sown	Seed germination	
					No.of seeds germinated	Germination %
1	Pot-1	Control	Soil	10	6	60
2	Pot-2	M-10%			8	80
3	Pot-3	M-20%			8	80
4	Pot-4	L-10%			6	60
5	Pot-5	L-20%			5	50
6	Pot-6	M-10%+L-10%			5	50
7	Pot-7	M-20%+L-20%			8	80
8	Pot-8	M-10%+L-20%			7	70
9	Pot-9	M-20%+L-10%			8	80

Control-Tap water, M-10% indicates *Moringa oleifera* 10%, M-20% indicates *Moringa oleifera* 20%, L-10% indicates *Lawsonia inermis* 10% and L-20% indicates *Lawsonia inermis* 20%, M-10% + L-10% indicates *Moringa oleifera* 10% + *Lawsonia inermis* 10%, M-20% + L-20% indicates *Moringa oleifera* 20% + *Lawsonia inermis* 20%, M-10% + L-20% indicates *Moringa oleifera* 10%+ *Lawsonia inermis* 20%, M-20% + L-10% indicates *Moringa oleifera* 20%+ *Lawsonia inermis* 10%.

Table 6: Biometric analysis of *Lycopersicon esculentum* on 15th day

S.No	Parameters	Pot 1	Pot 2	Pot 3	Pot 4	Pot 5	Pot 6	Pot 7	Pot 8	Pot 9
1	Shoot length (cm)	6.0	9.6	9.1	5.5	5.5	5.5	8.7	9.4	9.5
2	Root length (cm)	4.6	9.2	8.9	4.6	4.7	6.3	7.8	8.0	9.1
3	Total length (cm)	10.6	18.8	18.0	10.1	10.2	11.8	16.5	17.4	18.6
4	Wet weight (g)	0.66	2.24	1.99	1.01	0.88	1.03	1.25	1.62	2.40
5	Dry weight (g)	0.44	1.09	0.83	0.69	0.56	0.78	0.89	0.92	1.04
6	Total leaves (No's)	17	28	24	18	17	19	21	24	30
7	Branches (Counting)	5	6	6	5	5	5	7	6	9

Pot-1 indicates Control, Pot-2 indicates *Moringa oleifera* 10%, Pot-3 indicates *Moringa oleifera* 20%, Pot-4 indicates *Lawsonia inermis* 10%, Pot-5 indicates *Lawsonia inermis* 20%, Pot-6 indicates *Moringa oleifera* 10% + *Lawsonia inermis* 10%, Pot-7 indicates *Moringa oleifera* 20% + *Lawsonia inermis* 20%, Pot-8 indicates *Moringa oleifera* 10% + *Lawsonia inermis* 20%, Pot-9 indicates *Moringa oleifera* 20% + *Lawsonia inermis* 10%.

Table 7: Biometric analysis of *Lycopersicon esculentum* on 30th day

S.No	Parameters	Pot 1	Pot 2	Pot 3	Pot 4	Pot 5	Pot 6	Pot 7	Pot 8	Pot 9
1	Shoot length (cm)	8.0	12.6	12.0	8.3	7.2	7.0	10.8	11.3	12.5
2	Root length (cm)	6.2	15.2	14.3	8.0	9.0	8.1	12.9	10.0	14.6
3	Total length (cm)	14.2	27.8	26.3	16.3	16.2	15.1	23.7	21.3	27.1
4	Wet weight (g)	1.05	2.28	2.65	1.21	1.07	1.32	1.83	1.83	2.28
5	Dry weight (g)	0.73	1.02	1.08	0.80	0.78	0.81	0.91	0.92	1.04
6	Total leaves (No's)	19	27	33	18	19	21	27	28	34
7	Branches (Counting)	6	8	9	6	6	7	8	8	9

Pot-1 indicates Control, Pot-2 indicates *Moringa oleifera* 10%, Pot-3 indicates *Moringa oleifera* 20%, Pot-4 indicates *Lawsonia inermis* 10%, Pot-5 indicates *Lawsonia inermis* 20%, Pot-6 indicates *Moringa oleifera* 10% + *Lawsonia inermis* 10%, Pot-7 indicates *Moringa oleifera* 20% + *Lawsonia inermis* 20%, Pot-8 indicates *Moringa oleifera* 10% + *Lawsonia inermis* 20%, Pot-9 indicates *Moringa oleifera* 20% + *Lawsonia inermis* 10%.

Table 8: Qualitative phytochemical analysis of *Lycopersicon esculentum* on 30th day

S.No	Parameters	Pot 1	Pot 2	Pot 3	Pot 4	Pot 5	Pot 6	Pot 7	Pot 8	Pot 9
1	Alkaloid	+	+	-	+	+	+	+	+	+
2	Flavanoid	+	+	-	+	+	+	+	+	+
3	Saponins	-	-	+	-	-	+	-	-	-
4	Tannins	-	-	-	-	-	-	-	-	-
5	Terpenoids	-	-	-	-	-	+	+	-	-
6	Glycosides	-	-	-	-	-	-	-	-	-
7	Protein	+	+	+	+	+	+	+	+	+
8	Carbohydrate	+	+	+	+	+	+	+	+	+
9	Steroids	-	-	-	-	-	+	-	-	-
10	Quinine	-	-	-	-	-	+	+	-	-

(+) indicate Positive and (-) indicate Negative

Pot-1 indicates Control, Pot-2 indicates *Moringa oleifera* 10%, Pot-3 indicates *Moringa oleifera* 20%, Pot-4 indicates *Lawsonia inermis* 10%, Pot-5 indicates *Lawsonia inermis* 20%, Pot-6 indicates *Moringa oleifera* 10% + *Lawsonia inermis* 10%, Pot-7 indicates *Moringa oleifera* 20% + *Lawsonia inermis* 20%, Pot-8 indicates *Moringa oleifera* 10% + *Lawsonia inermis* 20%, Pot-9 indicates *Moringa oleifera* 20% + *Lawsonia inermis* 10%.

Table 9: Estimation of chlorophyll and carotenoid

S. No	No. of Pots	Pots	Chlorophyll 'a' (645 nm)	Chlorophyll 'b' (663 nm)	Total Chlorophyll (C_a-C_b)	Carotenoid (480 nm)
1	Pot-1	Control (Water)	0.47	0.54	1.01	1.06
2	Pot-2	M-10%	0.59	0.67	1.26	1.25
3	Pot-3	M-20%	0.58	0.61	1.19	1.23
4	Pot-4	L-10%	0.48	0.51	0.99	1.12
5	Pot-5	L-20%	0.49	0.58	1.07	1.02
6	Pot-6	M-10%+L-10%	0.46	0.52	0.98	1.10
7	Pot-7	M-20%+L-20%	0.58	0.57	1.15	1.13
8	Pot-8	M-10%+L-20%	0.49	0.55	1.04	0.98
9	Pot-9	M-20%+L-10%	0.58	0.59	1.17	1.17

Control-Tap water, M-10% indicates *Moringa oleifera* 10%, M-20% indicates *Moringa oleifera* 20%, L-10% indicates *Lawsonia inermis* 10% and L-20% indicates *Lwasonia inermis* 20%, M-10% + L-10% indicates *Moringa oleifera* 10% + *Lawsonia inermis* 10%, M-20% + L-20% indicates *Moringa oleifera* 20% + *Lawsonia inermis* 20%, M-10% + L-20% indicates *Moringa oleifera* 10%+ *Lawsonia inermis* 20%, M-20% + L-10% indicates *Moringa oleifera* 20%+ *Lawsonia inermis* 10%.

Table 10: Estimation of carbohydrate and protein

S. No	No. of Pots	Pots	Carbohydrate (mg/ml)	Protein (µg/ml)
1	Pot-1	Control	111.00	1030.00
2	Pot-2	M-10%	186.60	1740.00
3	Pot-3	M-20%	146.60	1440.00
4	Pot-4	L-10%	123.10	1130.00
5	Pot-5	L-20%	132.80	1560.00
6	Pot-6	M-10%+L-10%	151.30	1410.00
7	Pot-7	M-20%+L-20%	142.10	1620.00
8	Pot-8	M-10%+L-20%	130.10	1320.00
9	Pot-9	M-20%+L-10%	160.40	1930.00

SUMMARY AND CONCLUTION

The present study was performed to evaluate the ascendary of Soil than to employ the 10% and 20% of *Moringa oleifera* and *Lawsonia inermis* were individually and synergistically sprayed to obtain maximum plant growth and development.
10% and 20% of *Moringa oleifera* and *Lawsonia inermis* plant leaves extract was prepared by using extraction method.

Garden soil was collected and analysed its potency for the growth of plants.

The pot study was employed on (Control, 10% and 20% of *Moringa oleifera* and *Lawsonia inermis* were individually and synergistically sprayed) the growth of *Lycopersicon esculentum*.

The physico chemical properties of the different concentration of 10% and 20% of *Moringa oleifera* and *Lawsonia inermis* were individually and synergistically which was taken for our study.

Ten seeds were taken and germination was observed on 80% in pot-2 (*Moringa oleifera* 10% spraying) and pot-9 (*Moringa oleifera* 20% + *Lawsonia inermis* 10% spraying).

The biometric measurement was studied on 15^{th} and 30^{th} day of plant growth. The maximum yield was obtained on pot-2 (*Moringa oleifera* 10% spraying) and (*Moringa*

oleifera 20% +*Lawsonia inermis* 10% sparying) and then control when compared with all other treatments.

10 Qualitative phytochemical tests were conducted for different concentration of 10% and 20% of *Moringa oleifera* and *Lawsonia inermis* were individually and synergistically sprayed samples and *Lycopersicon esculentum* plants. It was clearly understandable that the alkaloids, flavanoids, protein, carbohydrate were present in all extracts.

Chlorophyll a, Chlorophyll b, Carotenoids test were carried out in 80% Acetone and 20% distilled water. The maximum result on pot-2 (*Moringa oleifera* 10% spraying) of *Lycopersicon esculentum* (chlorophyll a- 0.59mg/ml, cholorophyll b- 0.67mg/ml, carotenoid-1.25mg/ml).

It was recognized that the level of total carbohydrate and protein content of the plant *Lycopersicon esculentum* were highly enhanced by the combined with *Moringa oleifera* + *Lawsonia inermis*. Among the diverse treatment, pot-2 (*Moringa oleifera* 10% spraying) (186.60 μg/ml, 1740.00 μg/ml) and pot-9 (*Moringa oleifera* 20% + *Lawsonia inermis* 10% spraying) (160.40 μg/ml, 1930.00 μg/ml) were recorded the highest carbohydrate, protein content compare to the control pot.

It was concluded that *Moringa oleifera* and *Lawsonia inermis* leaf extract act as a potential natural growth enhancer as a cheap source of plant growth and development of *Lycopersicon esculentum* plants. The extract can be used in the form of a spray to accelerate the growth of young plants. The combination of both plant leaves extract was well growth on tomato plant.

This shows that plant extracts can be used in the major field of plant growth on *Lycopersicon esculentum*. Hence it is recommended to use both plant leaf extract as good fertilizer for plant growth enhancer.

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