

EFFCACY OF COIR PITH AND LEAF LITTER OF PROSOPIS JULIFLORA ON GROWTH OF SELECTED GREEN LEAFY VEGETABLE

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Abstract:

India is an agricultural country where intensive agriculture practices were rendered. Using fertilizers in agricultural field fortify the growth of plants and improves the soil quality. Using of chemical fertilizer degrade the soil quality. Therefore people turned to biofertilizer or organic amendment in the agriculture field is become commercialized. So utilization of leaf litters of *Prosopis juliflora* which is an invasive weed and coir pith is the debris of coconut husk can be used as manure for other plant growth. In this study, three different proportions of potting medium were prepared with soil as control, soil + coir pith(1:1 ratio), soil + coir pith(1:1 ratio) + 1%g of *P. juliflora* leaf powder and soil + coir pith(1:1 ratio) + 5%g of *P. juliflora* leaf powder and soil + coir pith(1:1 ratio) . Seeds of six different green leafy vegetables were taken for enumeration and sown in each potting medium. The present data reveals that treatment of *P. juliflora* application had positive influence on plant growth and shows greater shoot & root length of plants and also in biomass of the dried plant material when compared to other combination. Knowing the hazardous of *Prosopis juliflora* people started to eradicate by burning them. So instead of incinerate they can be converted as organic manure and growth enhancer for crops and hence used as soil amendments.

Index Terms - *Prosopis juliflora*, Biofertilizer, Organic fertilizer, Organic amendments, Coir pith

I. Introduction

India is an agricultural country where intensive agricultural practices led disposal of large quantity of wastes that can be used as organic amendment to the soil to improve its physical properties including water retention permeability, water infiltration, drainage, aeration, structure & beneficial for plant growth and yield. [15]

Careful use of various soil amendments can improve the physical and biological condition of soil and provide the best possible starting ground for crops. Coir pith, a fine powder left out during the processing of coconut husk, is disposed off in a large quantity near coir industries and in coconut field. This coir pith, not only revitalizes plants, but also enhances uniformity in growth by enhancing water retention and microbial activity. Coir pith contains high quality of nutrients that keep the soil healthy in a natural way. [16]

Prosopis juliflora (Sw.) DC. belongs to Fabaceae family. In tamil known as 'seemai karuvelam' tree upto 10 m high; bark deeply wavy fissured, yellowish-brown; branchlets zig-zag, glabrous; spines straight. Leaves bi-pinnate, alternate, stipular thorn to 1.5 cm long; petiole 1-5 cm long, slender, lamina 6-23 x 1.5-5 mm, oblong, base obtuse, apex obtuse, margin entire, glabrous. Flowers bisexual, greenish-yellow, subsessile, in axillary spikes, calyx 1.5 mm long, campanulate, glabrous, 5-toothed; petals 5, ligulate; stamens 10, anthers with an apical gland ovary superior; pubescent, ovules many; style filiform; stigma minute. Fruit a pod, 20-30 x 1.5 cm, pale yellow, glossy, smooth, flattened; seeds ovoid, brown, embedded

in pulpy mesocarp.[17] It is an invasive weed abundantly present in our area, is used as organic manure because it is long lasting in our country. Moreover it germinates very fast and spread easily as a weed leaving huge litter.

To prevent the environment from pollution, organic wastes such as coir pith and leaf litter of *Prosopis juliflora*, can be used as manure by adding them as a supplement to soil as potting medium in different proportions.

II. Materials & Methods

BASAL MEDIUM

Garden soil is used as the main substrate of potting medium.. It contains the necessary nutrients which are efficient for the plant growth. (Plate 1)



Plate 1: Soil as Basal medium

PROCESSING OF COIR PITH

Coir pith was collected from a coir industry near Vaadipatti, Madurai district. It was dried and used directly as organic amendment without any processing. (Plate 2)



Plate 2: Coir as an Organic Amendment

COLLECTION AND PROCESSING OF PROSOPIS JULIFLORA LEAVES

Leaves of *Prosopis juliflora* were collected from the nearby field and were dried. After drying, the leaves were pulverized in a blender into powder. (Plate 3)



Plate 3: Leaves of *Prosopis juliflora*

PREPARATION OF POTTING MEDIUM:

Earthen ware pots of 1kg capacity were purchased in the local market. Garden soil and coir pith in 1:1 ratio was mixed and used as basal potting medium. Powder of *Prosopis juliflora* leaves were mixed with the basal potting medium in 1% and 5% concentrations. Carbon and nitrogen content of the 3 potting media were analysed using Elementar (Vario EL III). The filled in pots were sprinkled with water and kept overnight for sowing seeds. Following treatments were carried out in duplicates and are given below. (Table1)

Table 1: Details of treatments

TREATMENTS	COMPONENTS
To	Soil (1kg alone)
T1	Soil + coir pith (1:1 ratio)
T2	Soil + coir pith (1:1 ratio) + <i>Prosopis</i> leaf powder(1%)
T3	Soil + coir pith (1:1 ratio) + <i>Prosopis</i> leaf powder(5%)

SEEDS USED FOR THE POT STUDY:

Seeds of 6 different green leafy vegetables were procured from Farm aid services, Madurai. Details of the Green leafy vegetables chosen for this study are *Amaranthus gangeticus* (Thandu keerai); *Sesbania grandiflora* (Agathi keerai); *Amaranthus campestris* (Sirukeerai); *Trigonella foenum* (Vendhaya keerai); *Amaranthus dubius* (Arai keerai); *Spinacea oleracea* (Palak keerai)

Totally fifteen seeds were sown individually in each potting medium. Seeds were allowed to germinate and grow. Seed germination was observed on 5th day and percentage germination was calculated. pH of various potting media was checked on 0th day and at 5 days intervals upto 15 days. After germination sampling was done at 5days intervals. 3plants were randomly selected from each pot and used for morphometric studies such as shoot length, root length and dry biomass. [10]

III. Results and Discussion:

Organic manuring practices over application of inorganic fertilizers are more resources efficient in terms of reserves of recoverable nutrient elements, fossils fuels and soil properties. [9] There are many organic types of manure available to the farmers which have differential action on the plant growth and maintenance of soil fertility. [12]. Hence the study was undertaken to evaluate the growth of 6 different green leafy vegetables through soil application of coir pith with 2 different concentrations of leaf powder of *Prosopis juliflora*.

Pot experiment was done in duplicates using soil and soil + coir as a control and *Prosopis juliflora* is mixed with various concentration (1% and 5%) and prepared as a potting medium. (Plate 4)



Ag - *Amaranthus gangeticus*,
 Sg - *Sesbania grandiflora*,
 Ac - *Amaranthus campestris*

Tf - *Trigonella foenum*,
 Ad - *Amaranthus dubius*,
 So - *Spinacea oleracea*

Plate 4: Experimental set up at 0th day

Initially, total organic nitrogen and carbon content were analysed . In that the carbon content was totally absent in the garden soil and *Prosopis juliflora* has high amount of both carbon and nitrogen content. The details are given below (Table 2).

Table: 2 Carbon & Nitrogen content in soil

Components	Garden soil	Coir pith	<i>Prosopis juliflora</i>
Nitrogen(%)	0.572	0.814	4.074
Carbon(%)	0	22.50	56.90

Seed germination percentage was calculated of all the 6 different seed used for the experimental study. Among all the treatments 1% concentrations shows the higher germination percentage. The plant *Sesbania grandiflora* attains maximum yields while the plant *Amaranthus dubius* yields least germination percentage. The details are given below (Table 3).

Table: 3 Seed germination percentage

Treatments	Ag	Sg	Ac	Tf	Ad	So
T0	34%	47%	47%	33%	27%	47%
T1	40%	53%	47%	40%	27%	47%
T2	49%	60%	53%	50%	33%	53%
T3	50%	76%	64%	53%	40%	60%

pH of all various potting media was noted the at regular intervals. Initially the pH is high in ‘0’ day and further it is decreased. The average pH of all 6 different plants is about 6.5 -7.5. (Fig1& 2)

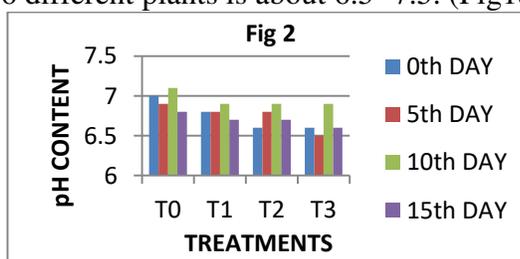
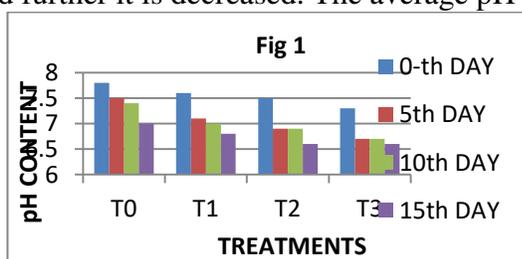
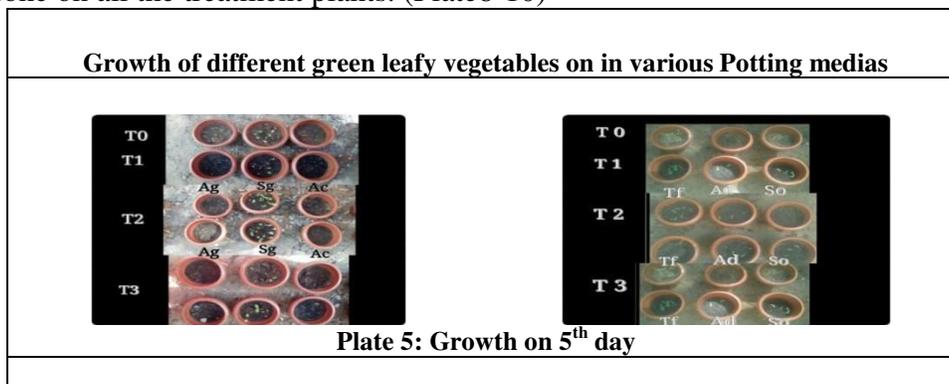


Fig 1: pH value of *Amaranthus gangeticus*, *Sesbania grandiflora*, *Amaranthus campestris*

Fig 2: pH value of *Trigonella foenum*, *Amaranthus dubius*, *Spinacea olerace*

Growth rate of all the 6 plants were periodically checked at regular intervals of time. Growth attributes such as shoot and root height and dried biomass were studied at 5days intervals.

The growth rate of both shoot and root shows maximum in 1% concentrations. (Plate 5-7). Sampling was done on all the treatment plants. (Plate8-10)



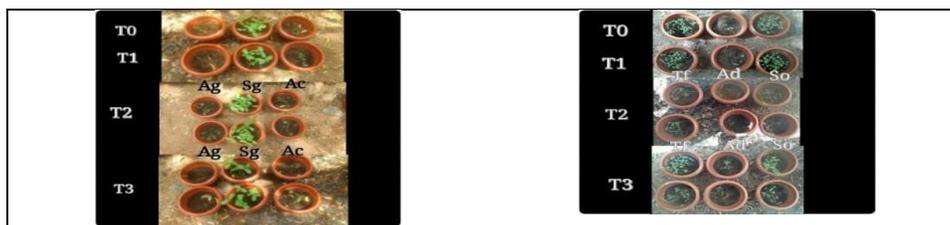


Plate 6: Growth on 10th day

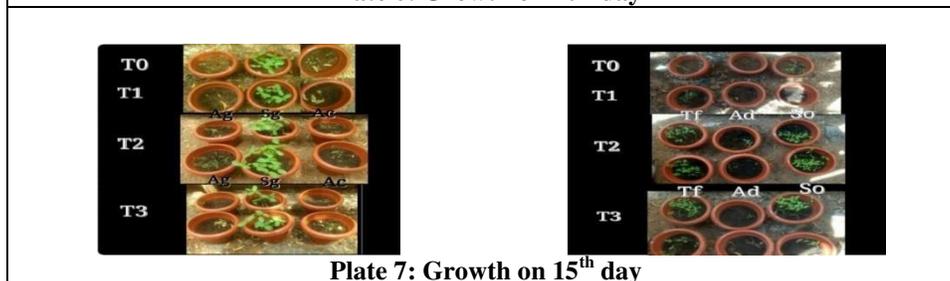
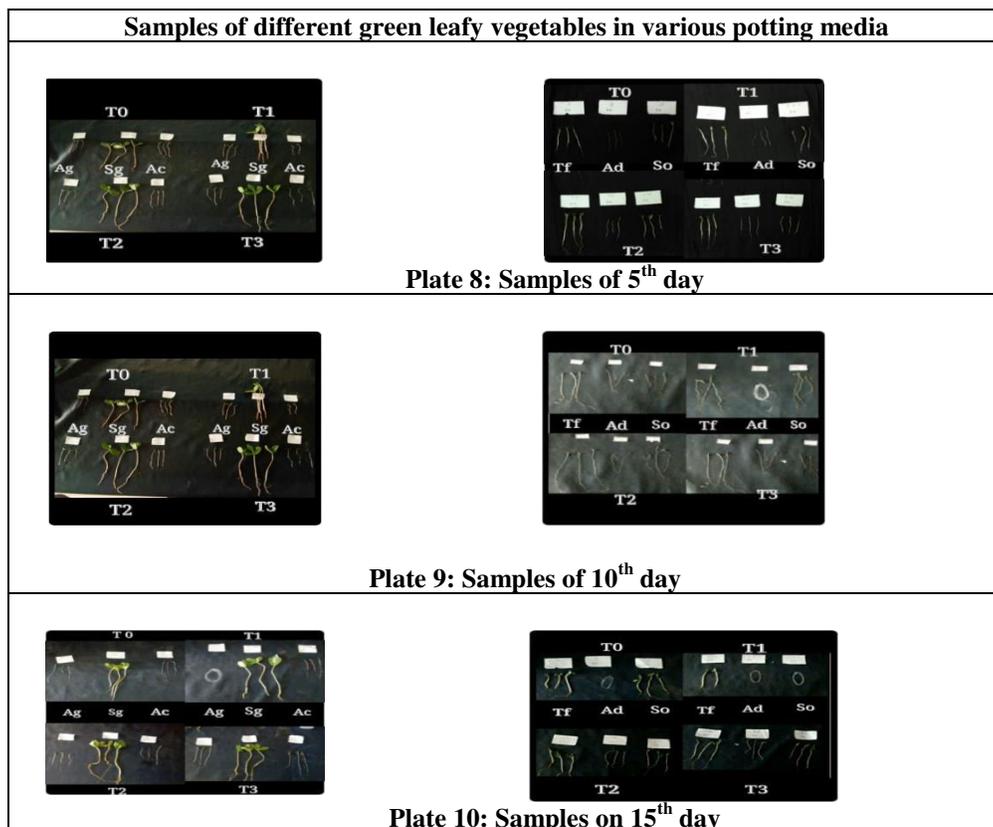
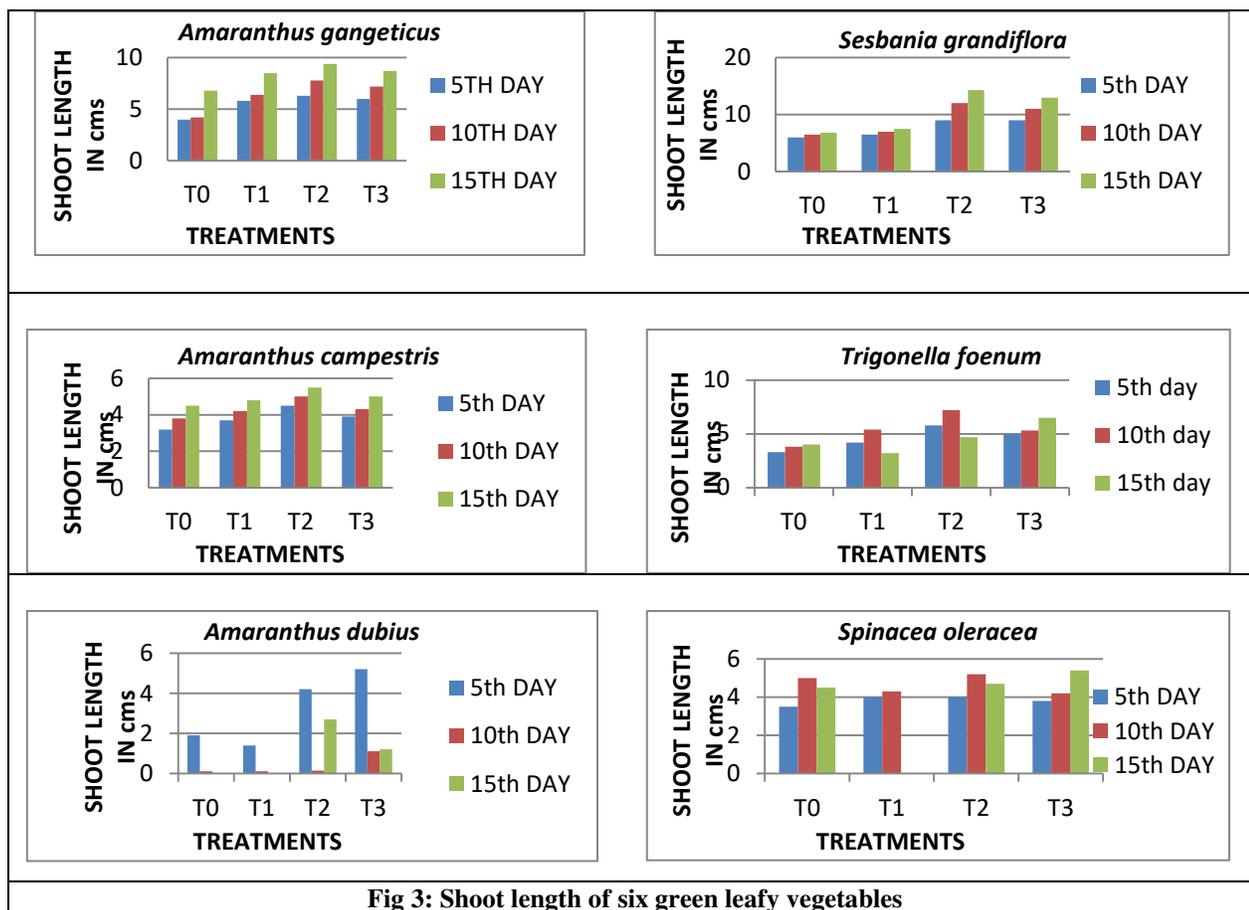


Plate 7: Growth on 15th day

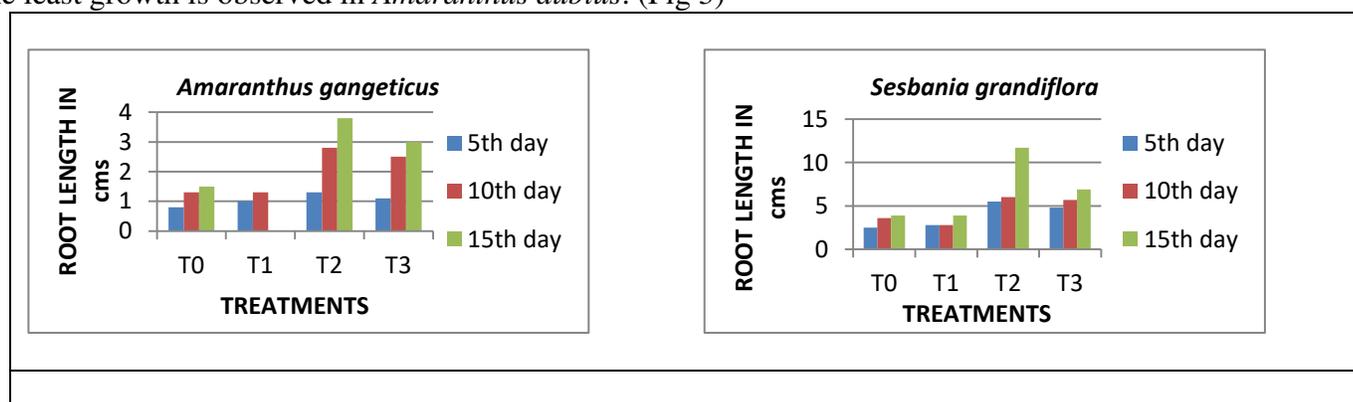
- (i) Ag-Amaranthus gangeticus, Sg-Sesbania grandiflora, Ac-Amaranthus campestris.
- (ii) Tf-Trigonella foenum, Ad-Amaranthus dubius, So-Spinacea oleracea

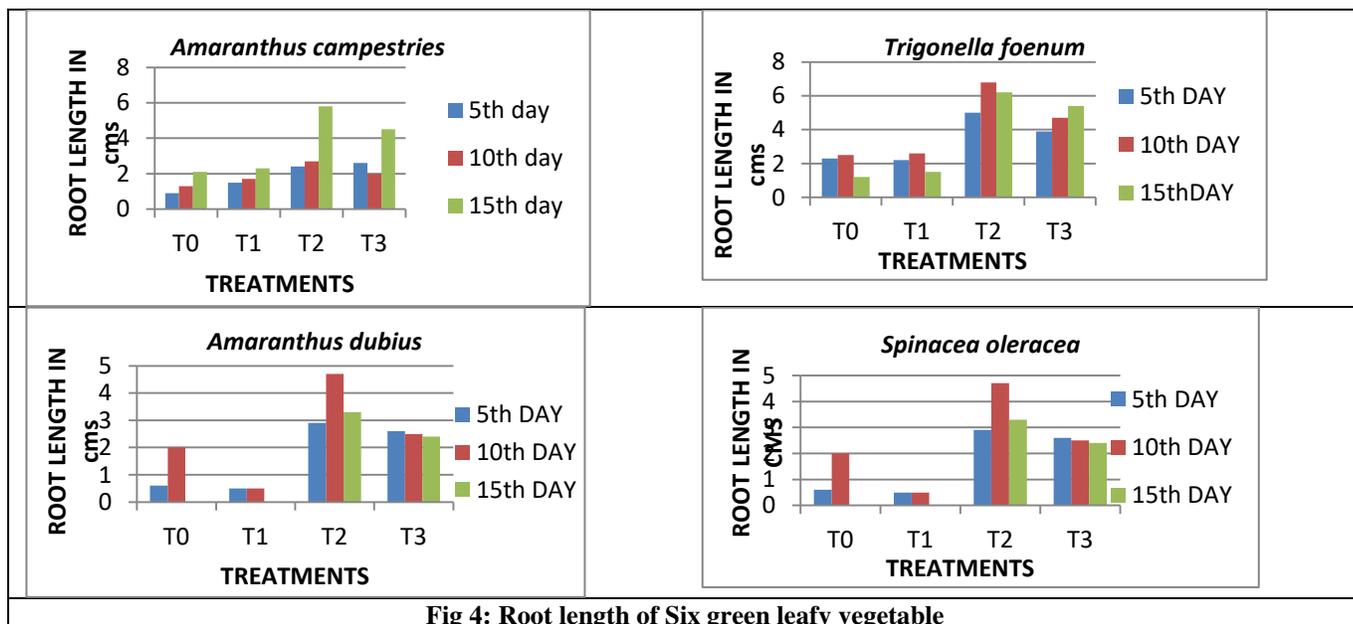


- (i) Ag-Amaranthus gangeticus, Sg-Sesbania grandiflora, Ac-Amaranthus campestris.
- (ii) Tf-Trigonella foenum, Ad-Amaranthus dubius, So-Spinacea oleracea



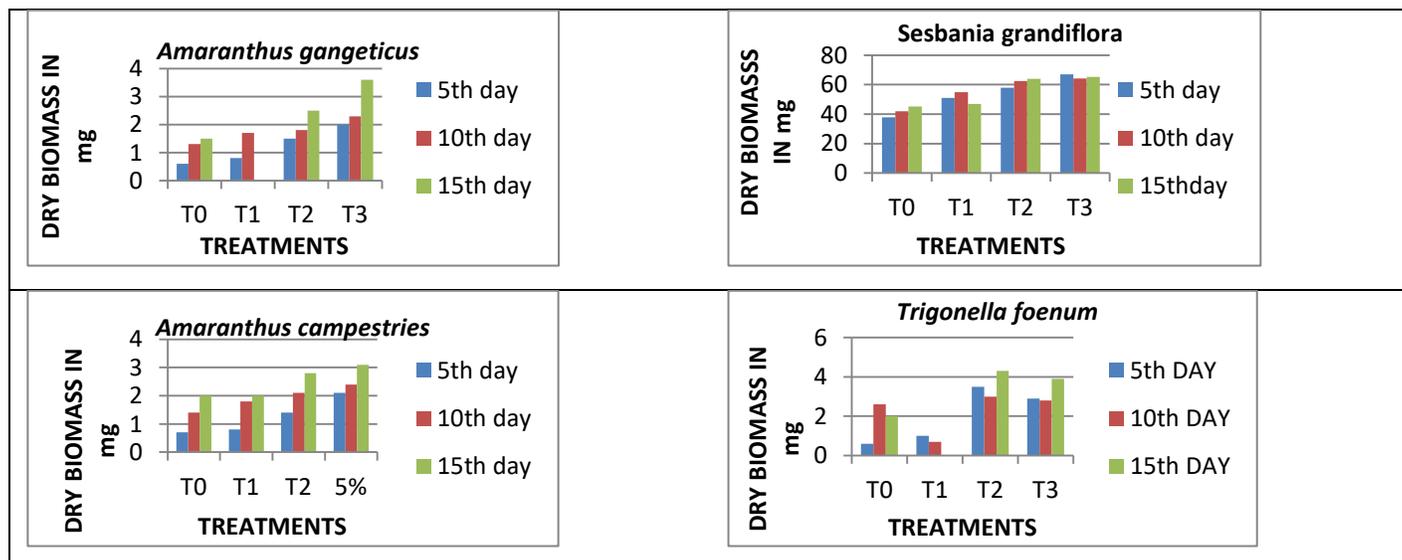
Among all the 6 different varieties of plants, the shoot growth of *Sesbania grandiflora* has higher while compare to other six green leafy vegetable, next to that *Trigonella foenum* has good growth rate and the least growth is observed in *Amaranthus dubius*. (Fig 3)





With regard to the root growth, the same plant *Sesbania grandiflora* attains vigorous root length while the plant *Amaranthus dubius* shows the least growth rate of root in correlate to other treatments in all the readings. (Fig 4).

In 4 different treatments maximum growth were observed in 1% concentration (T2) than the 5% concentration. Even in low concentration it shows the good growth rate.



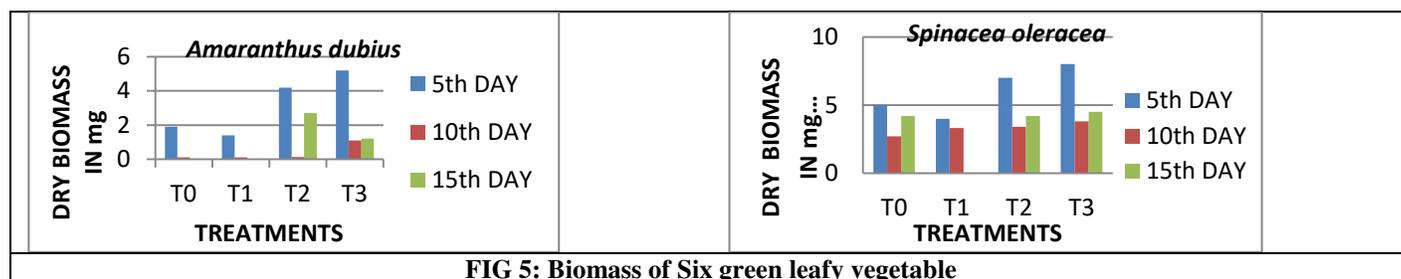


FIG 5: Biomass of Six green leafy vegetable

The dried biomass of all the 6 different plants, the 5% concentration shows greater biomass in comparison to the other treatments (Figure 15-20). In that the plant *Sebania grandiflora* has maximum amount of dry biomass (Figure 16).

In this study, treatment of *Prosopis juliflora* application had positive influence on plant growth, results are in accordance with documented literature which reported that response of various growth attributes and the concentrations of organic supplements through soil application. [5]

SUMMARY:

Increasing consciousness about conservation of environment as well as health hazards lead the farmers and researchers to search for alternate forms of agriculture in the world. So in India, the *Prosopis juliflora* is one of the most problematic weed which not only menace to agriculture but can cause environmental hazardous like depletion of ground water.

Considering the drawbacks and problematic nature of this weed attempts are made to utilize the plant, *Prosopis juliflora* as a source of organic manure in this experiment for the growth of green leafy vegetables. The plant, *Prosopis juliflora* is abundantly available so they can be applied as organic soil amendment for growth of other useful plants. Now People were started to eradicate the *Prosopis juliflora* by burning them. Burning of plants may cause air pollution. So instead of burning, they can be converted to manure so they can apply as soil amendment for the growth of other plant.

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