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Allelopathic Effect of Eucalyptus Extract on Seedling Germination Establishment of Wheat and Chickpea

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Abstract

Experiment is about the inhibitory and *Cicer arietinum* stimulatory allelopathic effect of seedling and germination of wheat *Triticum aestivum* (L) and chickpea (L) with 8 treatments In which the root length of chickpea 2% solution of Euclyptus water Extract (T_4) shows stimulatory effect and the remaining treatments shows inhibitory effect as shown " in tables. By applying treatments, the shoot fresh weight of chickpea in 2% solution of Euclyptus water extract (T_4) also performs well as compared to others, as shown in tables. But in shoot dry weight of chickpea, the treatment under control (T_1), 2% solution of euclyptus water extract (T_4), 2.5% solution of euclyptus water extract (T_5) and 5ppm of BAP solution (T_7) performed satisfactory results as compared to other treatments, as shown in tables. In the root fresh weight of chickpea, 1.5% solution of Euclyptus water Extract (T_3) performs healthy as compared to other treatments, as shown in tables and in root dry weight of chickpea, 5ppm of BAP solution (T_7) shown acceptable results as compared to other treatments, as shown in tables. However, In case of final leaves of chickpea the 5PPM of BAP solution (8^{th}) treatment performed superior then others, as shown in tables. Allelopathy shows the effect like inhibition of seed germination, seedling growth and alternation in physiology of seed germination. However in root length of wheat 1% solution of Euclyptus Water Extract (T_2) performed better as compared to other applied treatments, as shown in tables. Similarly, in shoot fresh weight 1% solution of Euclyptus Water Extract (T_2) also gives good results as compared to remaining treatments, as shown in tables. But in case of shoot dry weight the treatment 2.5% solution of Euclyptus Water Extract (T_5) performed superior as compared to other treatments as shown in tables. In root fresh weight the treatment 1% solution of Euclyptus Water Extract (T_2) performe healthy as compared to control treatment (T_o) and other remaining treatments, as shown in tables. In root dry weight treatment 3% solution of Euclyptus Water Extract T_6 performed very well as compared to other treatments, as shown in table. According to the performed experimental results treatment1.5% solution of Euclyptus Water Extract and 5ppm of BAP solution T_3, T_7 shows satisfactory results as compared to other treatments, as shown in table.

Keywords: *Cicer arietinum*, allelopathic effect, Euclyptus, chickpea.

Introduction

Allelopathy is a biological phenomenon by which the organisms produce one or more biochemicals that controls the germination, growth, reproduction and existence of other organisms. Allelopathy word is derived from 2 Greek words use by Hams Molish 1st time. Allelo means "mutually" and Pathy means "Harms". Allelochemicals are present in all parts of plants such as root stem. The widespread use of agrochemicals exclusively fungicides, which to carriage more of carcinogenic risk than other pesticides (Anonymous, 1987) may give rise to undesirable biological effects on animals and human beings. Allelopathy shows the effect like inhibition of seed germination, seedling growth and alternation in physiology of seed germination.

Euclyptus is derived from the Greek word which means "well-covered" .Eucalyptus belongs to kingdom Plantae , has family "Myrtacea" Genus "Euclyptus" and there is more then 500-700 species Eucalyptus known as Eucalyptus globulus, the Tasmanian bluegum, southern blue-gum or **blue gum**, is an evergreen tree, one of the most widely cultivated trees native to Australia. Eucalyptus plantings cover is about 10,000 ha in Pakistan (ref: Wikipedia). Allelo Chemicals such as Terpenses , Phenyle Propanoid, Cumarines, Glycosides, Flavonoids, Phenolic Acid. These are allelochemicals of Eucalyptus that are found in eucalyptus shows stimulatory and inhibitory effects on different crops. Euclyptus globulus also known as "Blue Gum" is the main source of eucalyptus oil used globally. Leaves are stem distilled to extract the oil, which is colorless liquid with a strong, sweet, woody scent. It is used to reduce symptoms of coughs cold and congestion, respiratory problems, fungal infection and wounds dental care, pain relief stimulating immune system fever, ulcers, diabetes, flue, and insects repellent. Aqueous extracts of air dried leaf litter of Eucalyptus had inhibitory effect on the seed germination, in wheat,

mustard gram (Ref: Singh *et al.* 1992). Eucalyptus inhibited seed germination and seedling growth of some herbaceous plants such as chick pea, maize, pea (Ref: M. Sumaira Pak J. Weed sci.). The Eucalyptus camaldulensis L. has been planted in the command area of chashma right Bank Canal D.I. Khan KPK Pakistan in Agro Forestry (Ref: Gomal Uni.).

Materials and Methods

A pot experiment was conducted in Research field area near Green Glass House in front of Department of Agronomy, BZU to check the allelopathic effect of eucalyptus leaf water extract on sprouting and seedling growth of wheat and chick pea. Eucalyptus extract was prepared by collecting fresh newly born young leaves from eucalyptus trees almost 1 kg and then these leaves were chopped with 75 ml water and then their extract was obtained by using extract machine. Seeds of glaxy-2011 (wheat variety) and Irani-2000(chick pea variety) were obtained. Pots were filled with sand and 6 seeds per pot was sown in each pot and after germination (2 weeks) thinning was done to keep 4 plants in each pots. Extract was applied at 1%, 1.5%, 2%, 2.5% and 3% concentration. After 15 days of sowing extract was T_0= Control , T_1=water spray ,T_2=1% EWS , T_3=1.5% EWS, T_4=2% EWS, T_5=2.5% EWS, T_6=3% EWS, T_7=BAP 5ppm (5 mg/lit.) The experiment was studied in CRD with each treatment replicated 3 times. The plants from each pot was harvested 20 days after sowing. Then sand from each pot was washed away and plants along with roots were collected. Shoot samples were separated from roots of each plant and were collected in separate paper bags that were labeled accordingly. Parameters Recorded: No. of Leaves, Shoot Length, Shoot Fresh Weight, Shoot Dry Weight, Root Length, Root Fresh Weight, Root Dry weight.

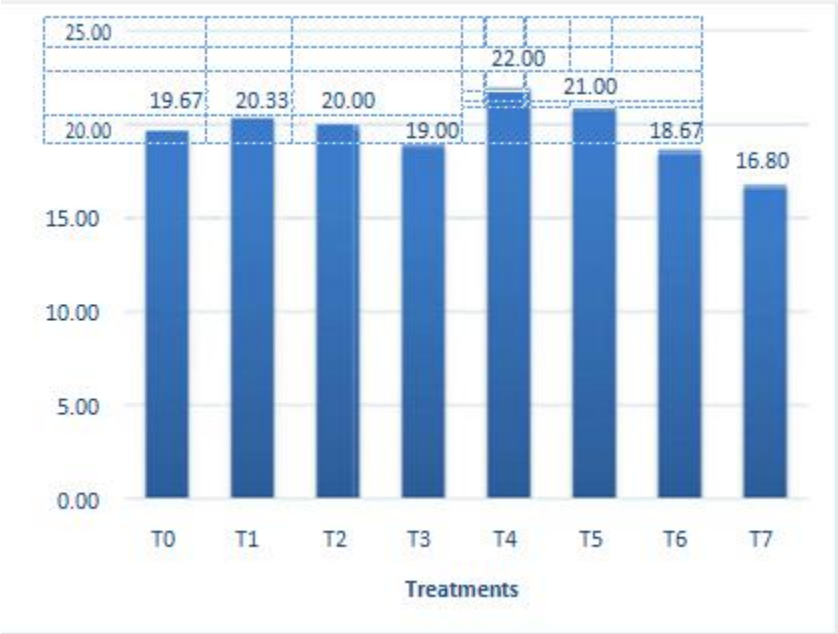
Results and Discussion

:The graph below shows the result of root length of chickpea. The root length of chickpea in T_4 is greater than T_o (control treatment) Root and shoot lengths were measured after harvesting. The length of shoot was measured and mean was taken. The mean was obtained of all treatments. It was observed that control and 3% eucalyptus water extract showed stimulatory effect as compared to other treatments in shoot length while in root length aqueous extract at concentration 2% and 2.5% showed stimulatory effect as compared to others. Both shoot and root length have variations in the results.

Root Length of chickpea

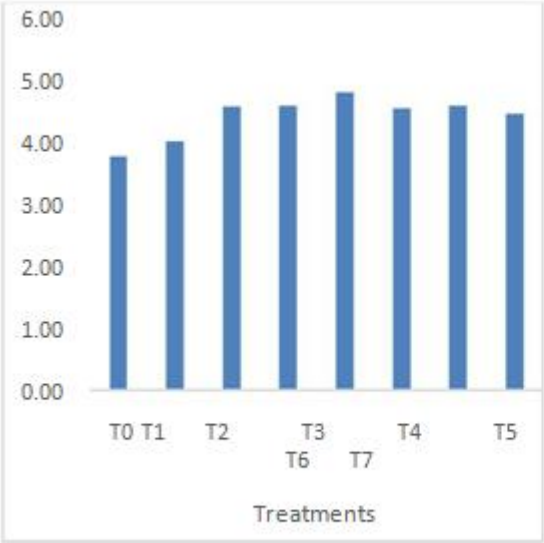
Root length of chickpea increase in T_4 as compared to under control treatment and BAP solution, as shown in the tables below.

Root length of chickpea

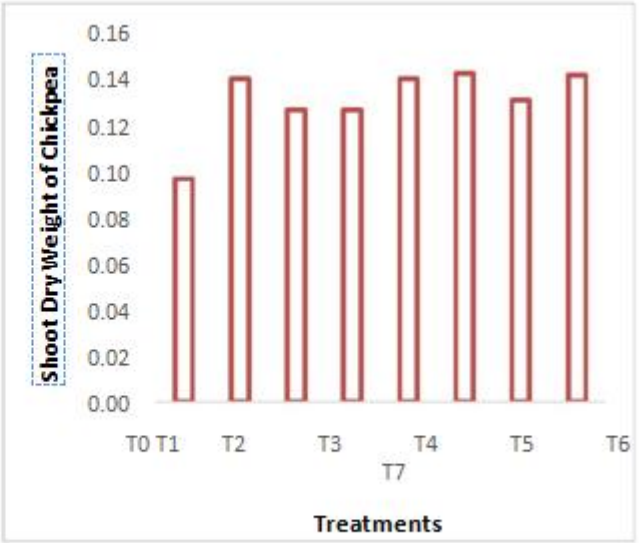


Shoot FW and DW:

The weights of shoot were taken just after harvesting. These weights were termed as fresh weights and after that plants roots and shoots were oven dried and then dry weights of shoot were taken.



Shoot Fresh Weight of chickpea



Shoot Dry Weight of chickpea

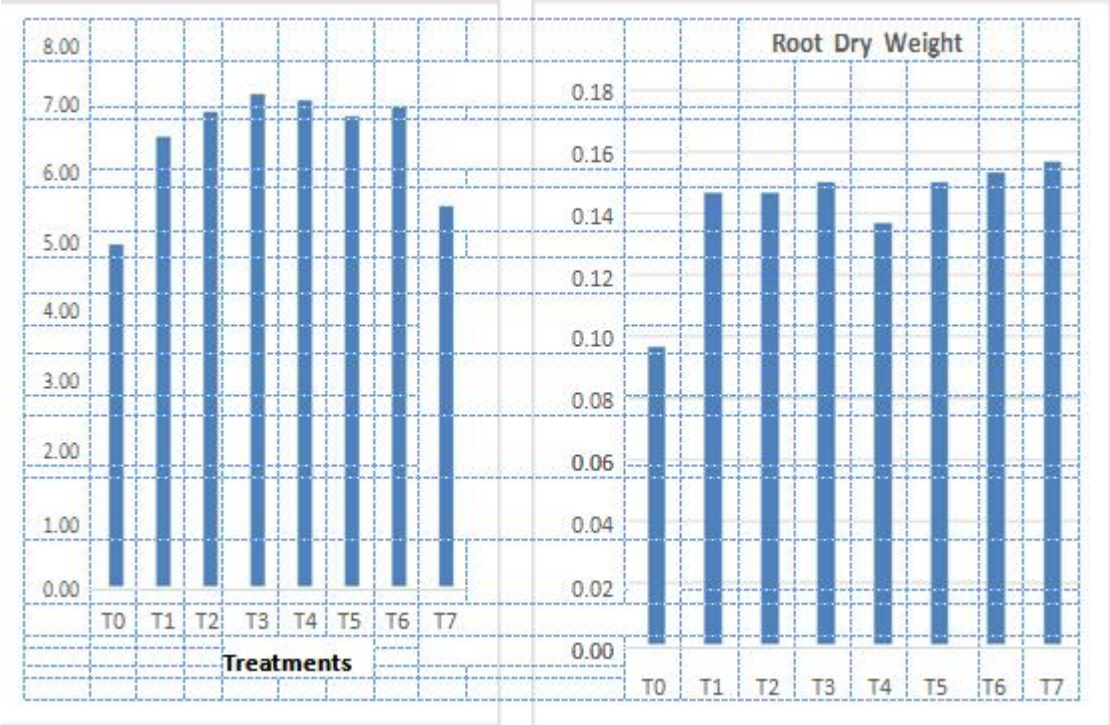
Shoot Fresh Weight of chickpea

The shoot fresh weight of chickpea increases in T_4 treatment by applying 2% eucalyptus water extract then other remaining applying treatments, as shown in table above.

Shoot Dry Weight of chickpea:

In the shoot dry weight of chickpea, the treatment of water spray , 2% solution of Euclyptus Water Extract, 2.5% solution of Euclyptus Water Extract and 5ppm of BAP solution (T_1, T_4, T_5 and T_7) performed satisfactory results as compared to other treatments, as shown in tables.

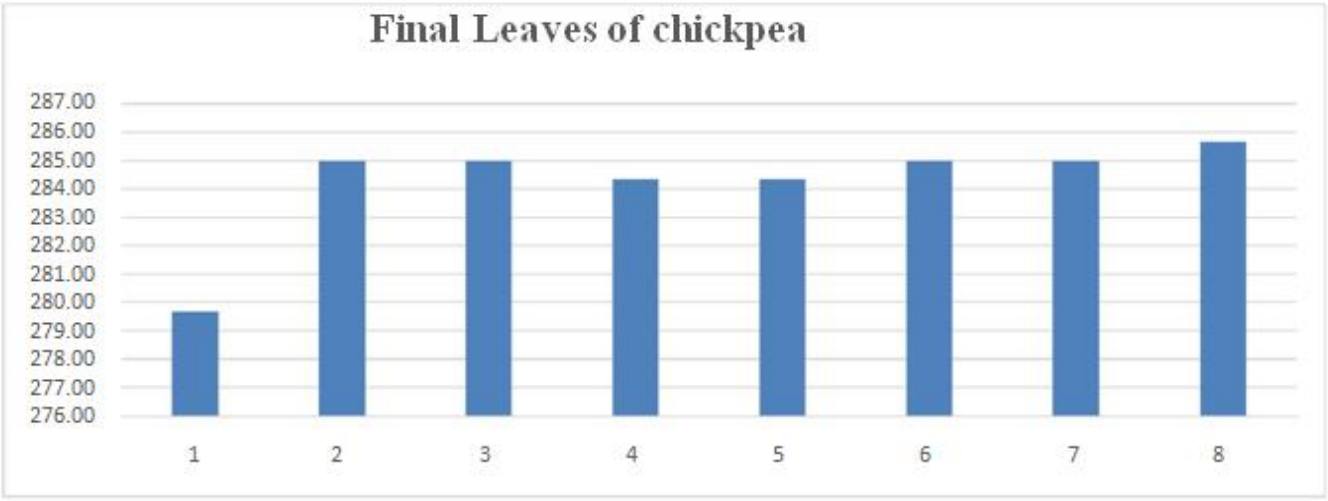
Root FW and DW: Similar to shoot fresh and dry weights, root fresh and dry weights were also observed. In fresh weight the T_3 1.5% solution of eucalyptus performed good as compared to other remaining treatments. In root dry weight of chickpea 5ppm of BAP solution T_7 shown acceptable results as compared to other treatments, as shown in table.



Root Fresh Weight of chickpea **Root Dry Weight of chickpea**

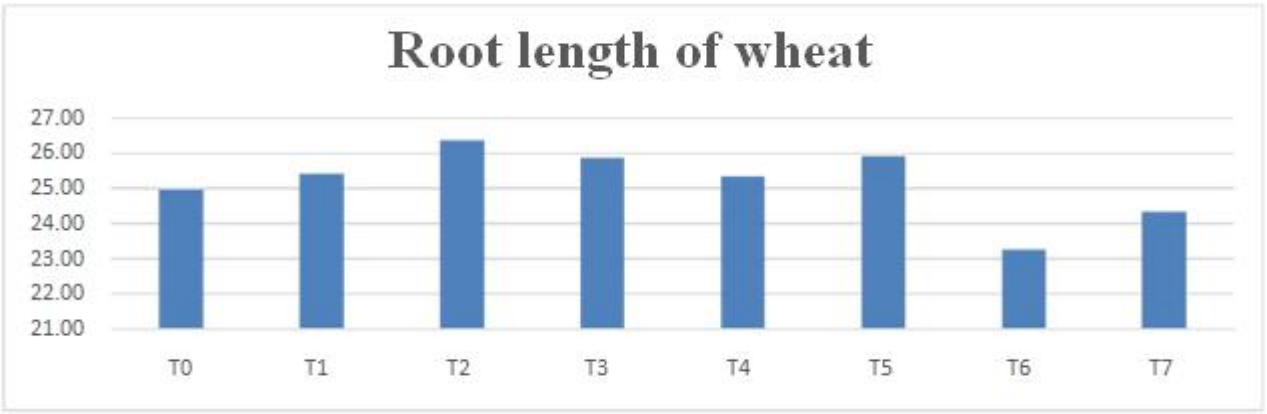
Final Leaves of chickpea

BAP was also added in the trial at 5ppm concentration, after final harvesting data, it was observed that BAP concentration at 5ppm. shows stimulatory effects while others gave inhibitory effect. in case of final leaves of chickpea the 8th treatment performed superior by the action of BAP solution then the control, water spray and the treatments applied in the experiment , as shown in table below.



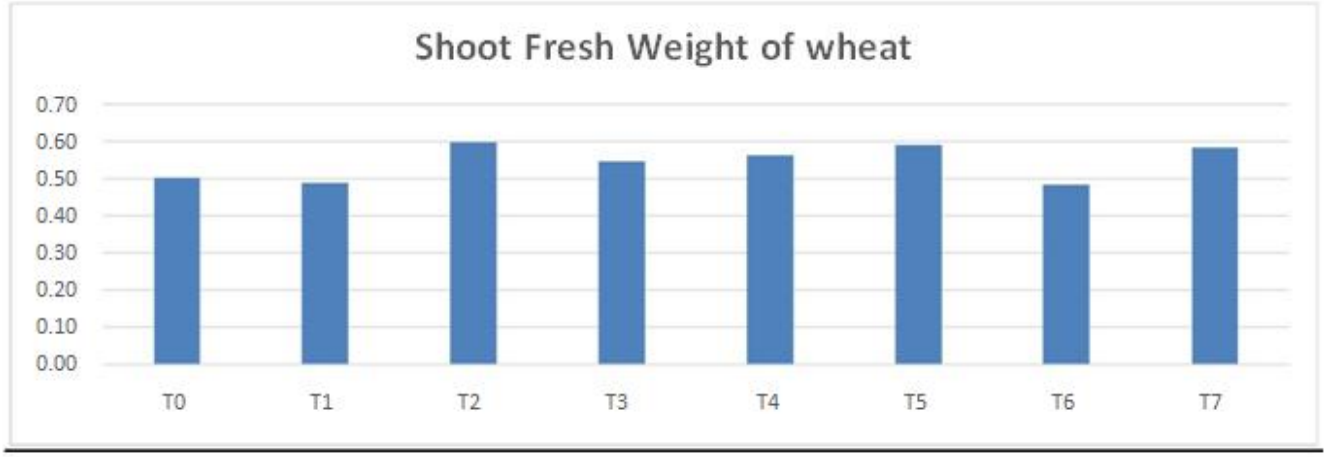
Wheat Shoot and Root length:

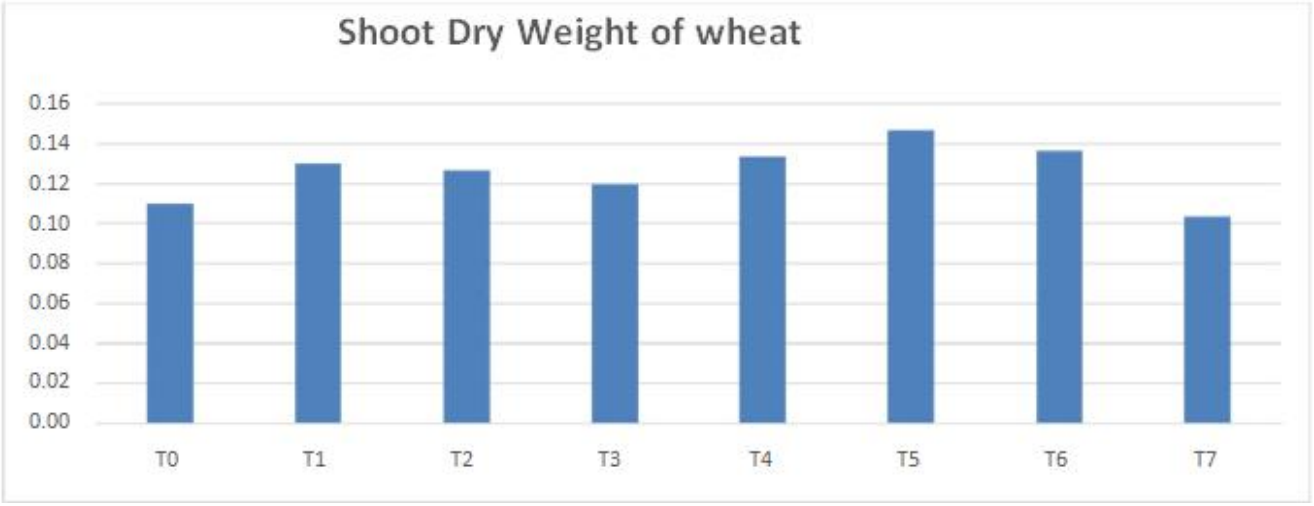
Root and shoot lengths were measured after harvesting. The length of shoot was measured and mean was taken. The mean was obtained of all treatments. The root length of wheat 1% solution of Euclyptus Water Extract T_2 performed better as compared to other applied treatments.



Shoot weight of wheat:

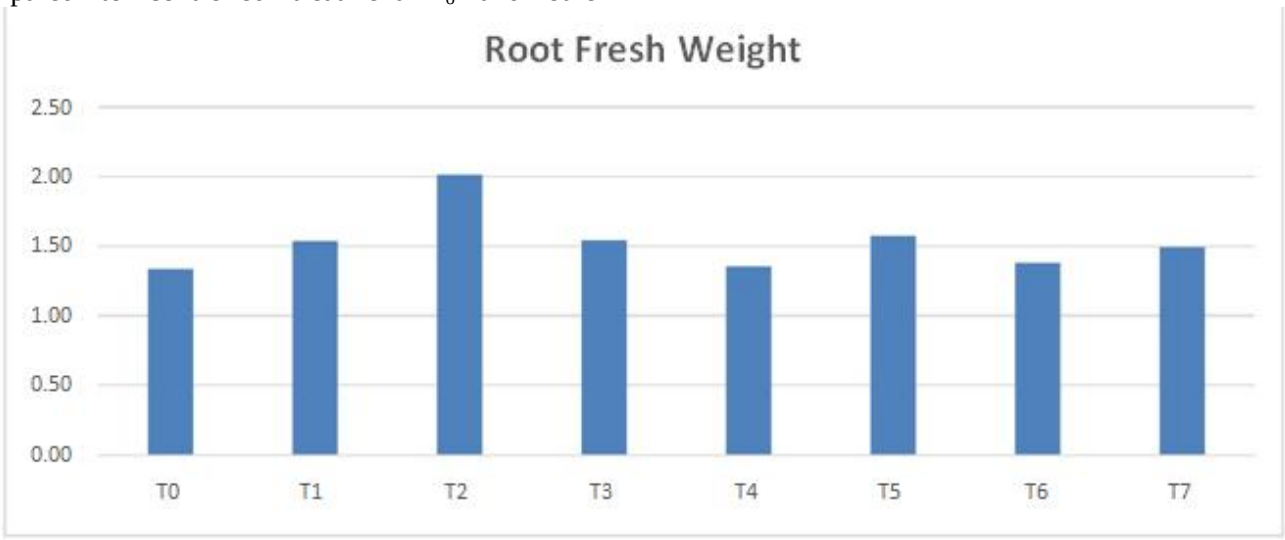
The weights of shoot were taken just after harvesting. These weights were termed as fresh weights and after that plants were oven dried and dry weights of shoot were taken. In shoot fresh weight 1% solution of Euclyptus Water Extract T_2 also give good, as shown in table But in case of shoot dry weight the treatment2.5% solution of Euclyptus Water Extract T_5 performed superior as compared to other treatments, as shown in table.

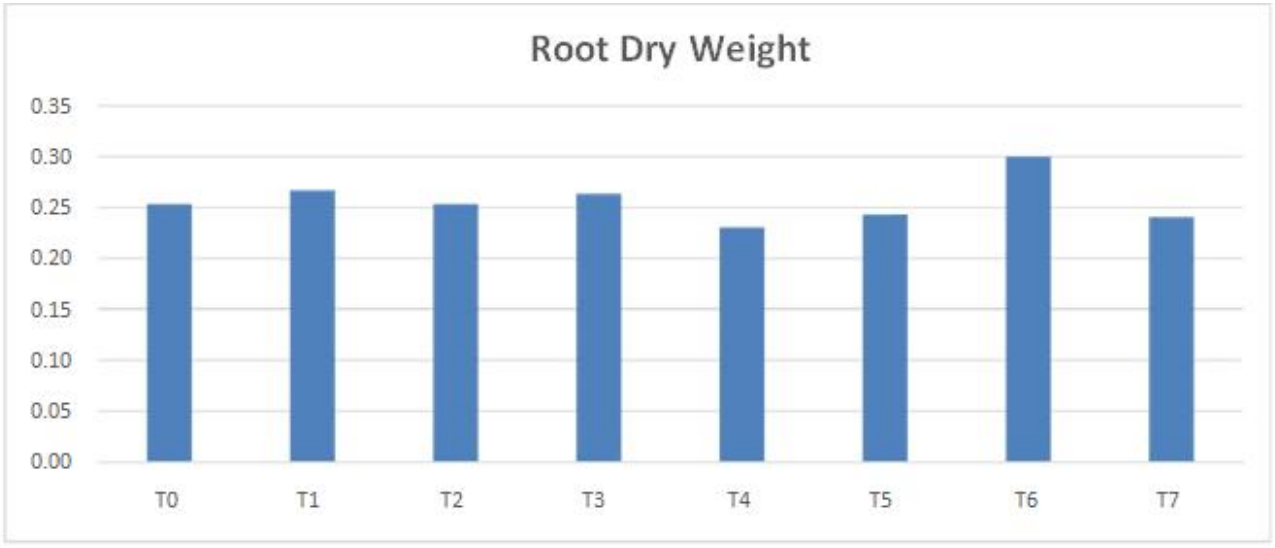




Root weight of wheat :

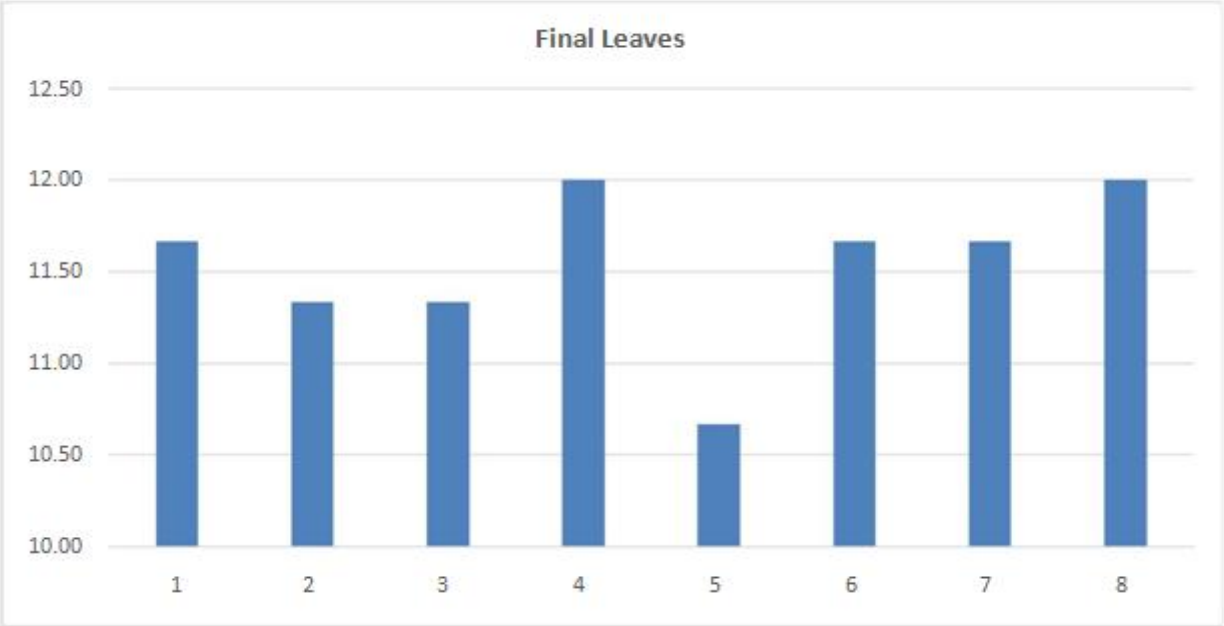
In root fresh weight the treatment 1% solution of Euclyptus Water Extract T_2 performs healthy as compared to controlled treatment T_o and other remaining treatments, as shown in table In root dry weight treatment 3% solution of Euclyptus Water Extract T_6 performed very well as compared to other treatments, as shown in table.





Final leaves of wheat

Euclyptus water extract was applied at different concentrations. Aqueous concentration at 1.5% and BAP 5ppm solution showed stimulatory effects while others gave inhibitory effect. The mean of number of leaves were observed in T_4 and T_8 treatments while other treatments showed variations at different concentrations.



Discussion

Allelopathic effects by eucalyptus extract on different parameters of chickpea:

According to the result of the performed experiments the root length of chickpea in 2% solution of Euclyptus Water Extract T_4 shows stimulatory effect and the remaining treatments shows inhibitory effect as shown " in table By applying treatments, the shoot fresh weight of chickpea in 2% solution of Euclyptus Water Extract T_4 also performs well as compared to others, as shown in table But in shoot dry weight of chickpea, the treatment of water spray , 2% solution of Euclyptus Water Extract, 2.5% solution of Euclyptus Water Extract and 5ppm of BAP solution (T_1, T_4, T_5 and T_7) performed satisfactory results as compared to other treatments, as shown in table In the root fresh weight of chickpea, 1.5% solution of Euclyptus Water Extract T_3 performs healthy as compared to other treatments, as shown in table and in root dry weight of chickpea,5ppm of BAP solution T_7 shown acceptable results as compared to other treatments, as shown in table However, In case of final leaves of chickpea the 8^{th} treatment performed superior by the action of BAP solution then others, as shown in table

Effects on different parameters of wheat:

In root length of wheat 1% solution of Euclyptus Water Extract T_2 performed better as compared to other applied treatments, as shown in table. Similarly, in shoot fresh weight 1% solution of Euclyptus Water Extract T_2 also give good, as shown in table . But in case of shoot dry weight the treatment 2.5% solution of Euclyptus Water Extract T_5 performed superior as compared to other treatments, as shown in table. In root fresh weight the treatment 1% solution of Euclyptus Water Extract T2 performed healthy as compared to controlled treatment T_o and other remaining treatments, as shown in table. In root dry weight treatment 3% solution of Euclyptus Water Extract T_6 performed very well as compared to other treatments, as shown in table According to the performed experimental results treatment1.5% solution of Euclyptus Water Extract and 5ppm of BAP solution T_3 , T_7 shows satisfactory results as compared to other treatments, as shown in table.

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