



EFFECT OF EXTRACTS OF GREEN ALGA *SPIROGYRA JUGALIS* (FL. DAN.) KUETZING ON SEED GERMINATION OF TOMATO

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ABSTRACT

Algae are known to contain different bioactive compounds. In present research work, extracts in different solvents, of green alga Spirogyra jugalis (Fl. Dan.) kuetzing, have been used to study their effects on tomato seeds. Cold water and hot water extracts have shown stimulatory effects in germination and development of shoot and root. Algal extracts prepared in acetone methanol, toluene also shown stimulatory effects. Extract prepared in petroleum ether did not favoured seed germination. Use of cold water and hot water can be recommended to farmers as a ecofriendly practice for better germination and growth. Present research work reveals that green alga Spirogyra jugalis contain certain growth promoting substances which enhances seed germination.

KEYWORDS : Algal extract, Seed germination and Tomato.

INTRODUCTION

Fresh water algae are rich source of structurally novel and biologically active compounds. These bioactive compounds influences seed germination and plant growth. They plays a promising role in antimicrobial activity. Algae and algal products are being used world wide to increase plant growth and yield. In India work on algal extract has been started in 1964 by Gupta. He studied, accelerated germination in paddy seeds treated with algal extracts. Bioactive compounds, present in green algae enhances all the physiological reactions that lead to good growth (Fayza and Zenaib, 2008). Fouly et. al. (1992) and Mahmood, (2001) observed that green algae contains high percentage of macronutrients, considerable amount of micronutrients and amino acids. Algal extract as organic biostimulant has proved beneficial in agriculture. Objectives of present research work were to study effect of extracts of green algae on seed germination. Green alga *Spirogyra Jugalis* (Fl. Dan.) Kuetzing is a fresh water alga, found abundant in Ujani reservoir of Pune district in Maharashtra. The alga was collected and used for making algal extracts in different solvents. Tomato (*Lycopersicon esculentum* Mill.) is one of the most important vegetable crops around the world in terms of human consumption and it is also most popular vegetable crop among farmers. Tomato is a commonly grown vegetable crop in Indapur tehsil area of Pune district of Maharashtra. Algal extracts in different solvents of *Spirogyra Jugalis* were used for seed germination of tomato.

MATERIALS AND METHODS

Collection of algal material and preparation of fine powder – The green alga *Spirogyra Jugalis* (Fl. Dan.) Kuetzing is a fresh water alga found floating on shallow water in Ujani reservoir of Pune district of Maharashtra. The alga was collected in large quantity from Takrarwadi back water area of Ujani reservoir in December 2012 and identified by microscopic observation. After identification, algal material was washed carefully and thoroughly with fresh water to remove unwanted impurities, epiphytes, adhering sand particles and mud. Algal material placed on filter paper sheet in shade for air drying at room temperature for 4 days. Shade drying of algal material is followed by oven drying at 40°C for 8 hours. After drying fine powder was prepared in grinder and stored in acid washed air tight bottles.

Preparation of algal extracts in different solvents – Algal extracts in different solvents such as cold water, hot water, acetone, methanol, ethanol, chloroform, petroleum ether and toluene were prepared. For the preparation of cold water extract 1gm of fine algal powder was taken in 100ml conical flask. 20 ml cool sterile distilled water added to it, flask plugged with cotton and kept it overnight. Next day it has been filtered through whatman filter paper No.1 and coloured filtrate obtained and used for soaking of seeds.

Hot water extract was obtained by taking 1gm of fine algal powder in 100ml conical flask. 50 ml sterile distilled water added to it and boiled for 10 to 15 minutes, cooled it and filtered. Filtrate obtained used for soaking of seeds. Extract in acetone was prepared by taking 1gm of fine algal powder in 100 ml conical flask. 20 ml of acetone added to it

and flask was plugged with cotton and kept overnight undisturbed in cool and dry place. The volume was restored and content were centrifuged to collect maximum supernatant. The content was filtered through whatman filter paper No.1 and filtrate was allowed to dry at room temperature. 20 ml of sterile distilled water was added to it and used for soaking of seeds. In similar way algal extract in different solvents were prepared separately.

Treatment of seeds with algal extract – The healthy seeds of improved variety – PKM – 1 of tomato were obtained from National seed. corporation, Akola (M.S.). To avoid microbial contamination during germination, the selected seeds were surface sterilized with 0.1% HgCl₂ solution. Surface sterilized 10 seeds were soaked in algal extract for 4 hours. Seeds soaked in sterilized water served as control. After that they were placed in equidistance on moist germinating paper for germination in sterilized petriplates. Percent germination, root and shoot length of seedling were measured after 7 days of incubation at room temperature.

RESULTS AND DISCUSSION

Effect of different extracts of *Spirogyra jugalis* on seed germination of tomato showed encourageing results (Table 1). In control germination was 60% with 5.5cm shoot length and 4.8 cm root length. Cold water extract shown 80% germination with 6.5cm shoot length and 5.1 cm root length 80% germination with 5.5 cm shoot length and 5.3 cm root length was observed in hot water extracts. Cold water and hot water extracts of *Spirogyra jugalis* shown promising results as compared to control. Similar kind of results were obtaining by Kamble (2008) while studying effects of extracts of *Spirogyra plena* on jowar, mothbean and seasamum. Kaur and Bhatnagar (2011) studied effect of aqueous extract of *Sargassum johnstonii* on growth, yield and quality of tomato. Rosalba et. al. (2013) studied effect of aqueous extracts of seaweed on growth of tomato seedlings. They found that liquid seaweed extracts from *Ulva lactuca* and *Padina gymnospora* stimulated growth of tomato seedlings. The extracts of both species showed better results when they were applied at lower concentrations than more concentrated extracts. Pingle and Abhang (2007) observed that cold water and hot water extracts of *Nostoc* and *Lyngbya* increases shoot length and root length of tomato, chilli and methi plants.

Extract in acetone shows 100% germination with 5.4cm shoot length and 6.4 cm root length. Methanol extracts shows 90% germination with 5.7cm shoot length and 8.2 cm root length. Ethanol and chloroform extracts shown moderate germination. Extract in toluene shows 80% germination with 5.5 cm shoot length and 5.6 cm root length. Petroleum ether extract did not favoured seed germination and totally inhibited seed germination. (Table 1). Results of present work is in agreement with earlier report (Kamble 2008).

Aqueous extracts of *Spirogyra jugalis* i.e. cold water and hot water extracts shown promising results in seed germination of tomato. This is useful to farmers in organic farming. Algal extracts prepared

in acetone, methanol, toluene also shown stimulatory effect on seed germination of tomato. Green alga *Spirogyra jugalis* contains growth promoting substances which stimulates seed germination.

CONCLUSION

In conclusion, this study shows that, seeds of tomato treated with extracts of *Spirogyra jugalis* shows enhancement in germination percentage, shoot length and root length. Cold water and hot water extracts shows stimulatory effects in seed germination. This ecofriendly practice can be recommended to farmers for attaining better germination and growth. Algal extracts prepared in acetone, methanol and toluene also shown stimulatory effect on seed germination. Present work reveals that green alga *Spirogyra jugalis* stimulates seed germination of tomato and therefore it is potential alga for the production of effective biostimulants.

Table 1 :- Effect of different extracts of *spirogyra jugalis* on seed germination of tomato.

Sr. No.	Solvent used for preparation of algal extract	Percentage of germination (%)	Shoot length (cm)	Root length (cm)
1	Cold water	80	6.5	5.1
2	Hot water	80	5.5	5.3
3	Acetone	100	5.4	6.4
4	Methanol	90	5.7	8.2
5	Ethanol	50	4.8	8.4
6	Chloroform	70	5.5	7.3
7	Petroleum ether	00	00	00
8	Toluene	80	5.5	5.6
9	Control	60	5.5	4.8

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