

Invitro evaluation of efficacy of selected plant extracts

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Abstract-The present study was conducted with the main purpose to assess two plant extracts viz. *Mentha piperita* and *Pongamia pinnata* at 5 different concentrations viz. 20%, 40%, 60%, 80% and 100% for seed germination on green gram with *Mentha piperita* and black gram with *Pongamia pinnata*. Plants were sun dried for seven days and grounded to powder with the help of pestle and mortar. Different concentrations of plant extracts were prepared by adding required amount of distilled water. Seeds were soaked for 24 hours followed by treating with different concentrations of plant extracts for 3 hours. After seed treatment seeds were transferred to the petriplates according to standard blotting technique. The petriplates were kept at normal day light and at room temperature. Drops of water were added to the petriplates twice a day to maintain moisture content and seed germination was observed for seven days. Untreated seeds were used as control. Experiments were done in triplicates and the results obtained in this study is the mean of triplicates. After seven days mean root length, shoot length and leaf length were measured and recorded.

Keywords- *Mentha piperita*, *Pongamia pinnata*, Plant extracts, Standard blotting technique

INTRODUCTION

Pulses have been recognised as a major source of protein with required amount of vitamins and minerals. With such nutrients, demand for production of pulses also increases.¹ Presently there are wide variety of chemicals which are used for increasing the production of these crop plants. The use of chemicals is associated with problems such as pollution and phytotoxicity. These problems make it crucial to develop new classes of compounds from natural products including plants which will promote the growth of crop plants and increase the production. Taking these factors into consideration the present study was conducted with the main purpose to evaluate the efficacy of two plants namely *Mentha piperita* and *Pongamia pinnata* on green gram and black gram respectively.

Mentha piperita commonly known as peppermint is a popular herb that is used in numerous forms viz. leaf, leaf extract, leaf water and oil. Most of it's used form is peppermint oil, it is used in food, cosmeceuticals, personal hygiene products, pharmaceutical products for both its flavouring and fragrance properties. Peppermint oil own a fresh sharp menthol odour and a pervasive taste and has a cooling sensation. It also has a variety of therapeutic properties and is used in bath preparations, mouthwashes, toothpastes, aromatherapy and topical preparations. Although peppermint oil is known for its many properties, its role as a excitizer should be acknowledged so as to help in the diagnosis of both dermatitis and oral conditions and to allow the beginning of proper preventive measures.² Because of the wide range of medicinal properties acquired by *Mentha piperita*, it was used in the present study for evaluation of its efficacy towards seed germination and seedling growth of green gram.

Pongamia pinnata also known as karanja tree or malapari is native to Asia and Australia. These are also cultivated in Africa, United States and other countries. These trees grow in humid and subtropical climate and is drought tolerant. *Pongamia* has numerous benefits both for humans and animals. It is a ornamental tree and its flowers are the great source of nectar for honey bees to produce dark honey. Recent researches revealed that leaves of *Pongamia pinnata* are medicinal. Liniment for skin diseases and rheumatic illnesses are prepared from oil of *Pongamia* seeds. Animal feed for ruminants and poultry, fertilizers can be obtained from press cake yeilded during extraction of oil from its seeds. The tree oil has a very old history of its use as lamp fuel, raw material for soaps, varnishes and paints. It is also used to repel insects in storage areas and as a mosquito repellent. The wood can be used for fuel and charcoal. The ash of wood of *Pongamia* can be used as dyeing agent. Research studies revealed that *Pongamia pinnata* has 44.7% oil content and can be used as biofuel.³ As there are many

researches going on to find the medicinal properties of *Pongamia pinnata* and many studies have documented the uses and medicinal value of *Pongamia pinnata*, the present study was the similar approach to evaluate the efficacy of *Pongamia pinnata* towards seed germination and seedling growth of black gram.

MATERIALS AND METHODS

Collection of plant samples

- Fresh leaves of *Mentha piperita* were collected from local market, Bengaluru
- Fresh leaves of *Pongamia pinnata* were collected from local park, Bengaluru

Collection of seed samples

Black gram (*Vigna mungo*) and green gram (*Vigna radiata*) seeds were collected from local market, Bengaluru.

Preparation of plant extracts

Fresh and healthy leaves were washed and finely chopped with sterile knife. Chopped leaves were sun dried for seven days and grounded to fine powder with the help of pestle and mortar first and then in grinder. Plant powder was sieved using 0.1 mm sieve. Different concentrations of plant extracts were prepared by using following measurements:

1. 100% concentration: 100 grams plant powder + 100 ml distilled water
2. 80% concentration: 80 grams plant powder + 100 ml distilled water
3. 60% concentration: 60 grams plant powder + 100 ml distilled water
4. 40% concentration: 40 grams plant powder + 100 ml distilled water
5. 20% concentration: 20 gram plant powder + 100 ml distilled water

Plant powders were soaked in distilled water for 48 hours with periodic shaking and filtered through whatmann no. 1 filter paper after 48 hours (infusion technique).⁴

Seed treatment

Seeds were soaked in distilled water for 24 hours followed by treating with different concentrations of plant extracts for 3 hours. After 3 hours of seed treatment the seeds were used for studying seed germination.

Seed germination assay

Glass petriplates were sterilised using 70% alcohol and 3 layers of moist blotting paper were added to the lower part of petriplate and 1 layer of blotting paper was added to the lid to maintain moisture content. After seed treatment, 25 seeds were arranged on to the petriplate in three rows according to standard blotting method (Doyer et al.,).⁵ The petriplates were kept at normal day light and at room temperature. Drops of water were added to the petriplates twice a day to maintain moisture content and seed germination was observed for seven days. Untreated seeds were used as control. Experiments were done in triplicates and the results obtained in this study is the mean of triplicates. After seven days mean root length, shoot length and leaf length were recorded.

RESULTS AND DISCUSSION

Efficacy of *Mentha piperita*

The maximum growth of root of green gram was observed in 0% (control) (6.45 cm) and least growth in 40% (5.13.cm). The maximum growth of shoot of green gram was observed in 80% (10.11 cm) followed by 40% (7.97 cm) and least growth in 60% (6.03 cm). The maximum growth of leaf of green gram was observed in 0% (1.66 cm) followed by 60% (1.38 cm) and least growth in 40% (1.31 cm) (Table 1). The wet weight of seedling treated with 80% concentration was found to be maximum (0.4 grams) followed by 60% (0.36 grams) and least wet weight was seen in 0%, 20%, 40% and 100% (0.32 grams) (Table 2). The dry weight of seedling treated with 80% concentration was maximum (0.24 grams) followed by 60% (0.23 grams) and least dry weight was seen in 0%, 20%, 40% and 100% (0.21 grams) (Table 3). Mozdzen et al., had studied the effect of aqueous extracts of peppermint (*Mentha piperita L.*) on the germination and the growth of selected vegetable and cereal seeds. Results revealed that *Mentha piperita* inhibited the growth of these seedling.⁶ These results are partially in accordance and partially in contrast with our results were *Mentha piperita* at certain concentration viz 80% promoted the shoot length while at all other concentration it inhibited the length of root, shoot and leaf. From the findings of Anestis Karkanis et al., inhibitory effect of *Mentha piperita* against seed germination of maize was revealed.⁷ These results are also partially in accordance and partially in contrast

with our results were *Mentha piperita* at certain concentration viz 80% promoted the shoot length of green gram while at all other concentration it inhibited the length of root, shoot and leaf.

Table 1: Mean root, shoot and leaf length of seedlings of green gram treated with *Mentha piperita*

Concentration	Mean root length (in cm)	Mean shoot length (in cm)	Mean leaf length (in cm)
0%	6.45	9.03	1.66
20%	5.87	7.57	1.34
40%	5.13	7.97	1.31
60%	6.04	6.03	1.38
80%	6.18	10.11	1.32
100%	6.16	7.54	1.36

Table 2: Wet weight of seedlings of green gram treated with *Mentha piperita*

Concentration	0%	20%	40%	60%	80%	100%
Wet weight (in grams)	0.32	0.3	0.3	0.3	0.4	0.32

Table 3: Dry weight of seedlings of green gram treated with *Mentha piperita*

Concentration	0%	20%	40%	60%	80%	100%
Dry Weight (in grams)	0.21	0.21	0.21	0.23	0.24	0.21

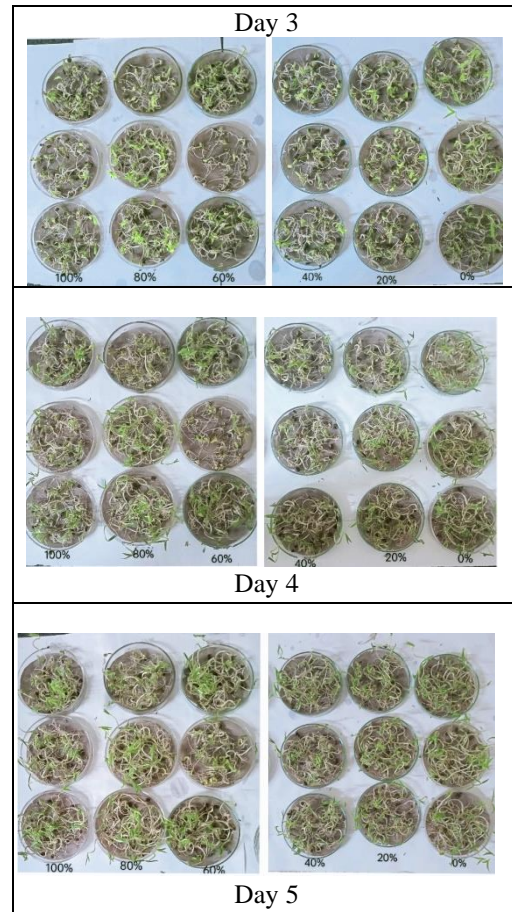
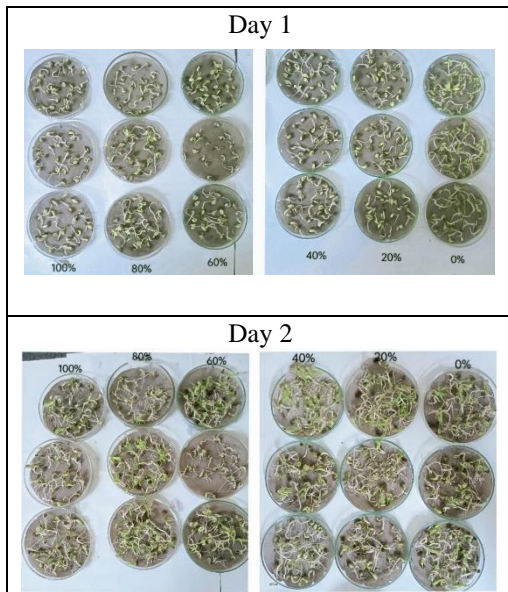


Figure 1: Seed germination of green gram treated with *Mentha piperita*



Efficacy of *Pongamia pinnata*

The maximum growth of root of black gram was observed in 100% (9.708 cm) and least growth in 0% (8.184 cm). The maximum growth of shoot of black gram was observed in 80% (6.713 cm) followed by 40% (5.509 cm) and least growth in 60% (4.355 cm). The maximum growth of leaf of black gram was observed in 80% (1.404 cm) followed by 20% (1.292 cm) and least growth in 40% (1.222 cm) (Table 4). The wet weight of seedling treated with 40% and 100% concentration was found to be maximum (0.32 grams) followed by 80% (0.28 grams) and least wet weight was seen in 20% (0.12 grams) (Table 5). The dry weight of seedling treated with 40% concentration was maximum (0.28 grams) followed by 100% (0.25grams) and least dry weight was seen in 20% (0.12grams) (Table 6). Bibi K.S et al., had studied the effect of aqueous extracts of *Pongamia pinnata* on seed germination of maize. Results revealed that *Pongamia pinnata* induced stress and reduced the seed

germination.⁸ These results are in contrast to our results where *Pongamia pinnata* promoted the root and shoot growth of black gram.

Table 4: Mean root, shoot and leaf length of seedlings of black gram treated with *Pongamia pinnata*

Concentration	Mean root length (in cm)	Mean shoot length (in cm)	Mean leaf length (in cm)
0%	8.184	5.342	1.25
20%	8.584	4.823	1.292
40%	9.531	5.509	1.222
60%	8.422	4.355	1.277
80%	9.586	6.713	1.404
100%	9.708	5.445	1.266

Table 5: Wet weight of seedlings of black gram treated with *Pongamia pinnata*

Concentration	0%	20%	40%	60%	80%	100%
Wet weight (in grams)	0.16	0.12	0.32	0.24	0.28	0.32

Table 6: Dry weight of seedlings of black gram treated with *Pongamia pinnata*

Concentration	0%	20%	40%	60%	80%	100%
Dry Weight (in grams)	0.12	0.08	0.28	0.2	0.2	0.25

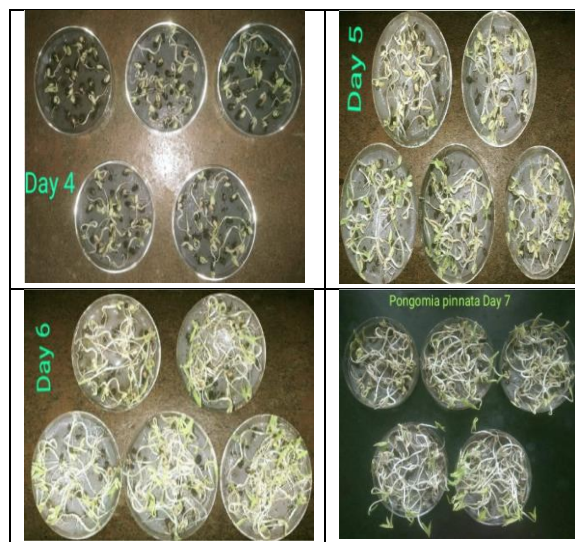
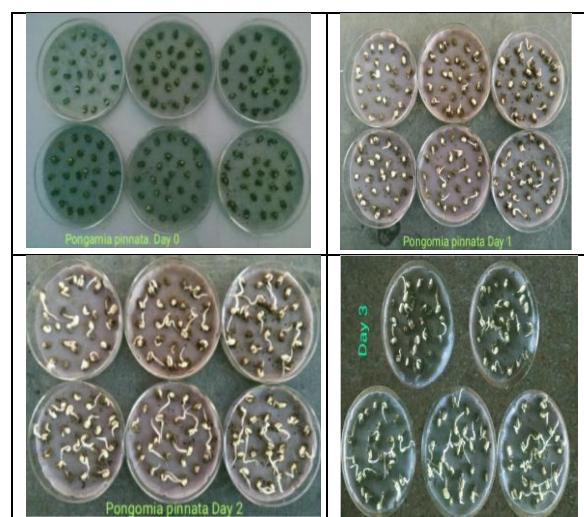


Figure 2: Seed germination of black gram treated with *Pongamia pinnata*

CONCLUSION

Results obtained from this study reveal efficacy of *Mentha piperita* and *Pongamia pinnata* towards promoting the seed germination and seedling growth of green gram and black gram. *Mentha piperita* at certain concentrations promoted the growth of green gram and at certain concentrations inhibited the growth of green gram while *Pongamia pinnata* at all concentrations promoted the growth of black gram. These plants would be recommended for seed treatment of pulses for promoting the growth of pulse crop plants and increasing the production.

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