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Short Communication

COMPARATIVE ALLELOPATHIC EFFECT OF *SYZYGIUM AROMATICUM* AND *MYRISTICA FRAGRANS* ON SEED GERMINATION OF *AMARANTHUS CRUENTUS*

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ABSTRACT

The present study aimed to compare the allelopathic effect of aqueous leaf extract of *Syzygium aromaticum* and *Myristica fragrans* on seed germination of *Amaranthus cruentus*. The study was conducted by petridish method using four different concentrations of aqueous leaf extracts of both plants for seven days. The control group was also maintained. The number of germinated seeds on each days of experiment were recorded and the germination percentage were calculated using the data obtained on the seventh day. The percentages of seed germination were found decreased according to the increasing concentration of leaf extracts of both plants. The aqueous leaf extract of *Syzygium aromaticum* showed more inhibitory effect on seed germination of *Amaranthus cruentus* than that of *Myristica fragrans*.

Keywords: Allelopathy, *Syzygium aromaticum, Myristica fragrans, Amarantus cruentus*.

1. INTRODUCTION

Allelopathy is a common biological phenomenon by which one organism produces biochemicals that influence the growth, survival, development, and reproduction of other organisms. These biochemicals are known as allelochemicals and have beneficial or detrimental effects on target organisms. Plant allelopathy is one of the modes of interaction between receptor and donor plants and may exert either positive effects(e.g., for agricultural management, such as weed control, crop protection, or crop re-establishment) or negative effects (e.g., auto toxicity, soil sickness, or biological invasion).To ensure sustainable agricultural development, it is important to exploit cultivation systems that take advantage of the stimulatory/inhibitory influence of allelopathic plants to regulate plant growth and development and to avoid allelopathic autotoxicity [1]. The term allelopathy is also defined as the harmful effects of one species on the germination, growth and development of another plant species [2]. Allelochemicals are the chemicals that released from the plants and imposing allelopathic influences. Allelochemicals are originating in foliage, root products, leaf litters or mulches of crops. Most allelochemicals are classified as secondary metabolites and it is produced as offshoots of the primary metabolic pathway of the plant [3]. Allelochemicals are present in several plant parts including roots, rhizomes, leaves, stem, Pollen, seeds and flowers. Allelochemicals are released into the environment by root exudation [4]. Several allelochemicals have been shows broad activity spectrum. *In vitro* experiments with 70 alkaloids indicate that most alkaloids are toxic to more than one group of organisms including seedling, bacteria, mammals [5].

Syzygium aromaticum (clove) is an aromatic tree belongs to Myrtaceae family of the order Myrtales. The clove of commerce is its dried unopened flower buds. The oil of clove is also extensively used as a flavoring agent. It is used in medicine for its antibacterial, antiseptic and antibiotic properties [6]. *Myristica fragrans* (nutmeg) is an aromatic evergreen tree usually growing about 5 to 13 m high. It belongs to the Myristicaceae family of the order Magnoliales It produces two spices: mace and nutmeg. It also possesses various therapeutic properties. Nutmeg has a characteristic pleasant fragrance and slightly worm taste [7]. The present investigation was designed to compare the allelopathic effect of aqueous extract of *Syzygium aromaticum* and *Myristica fragrans* on the seed germination of *Amaranthus cruentus* L.

2. MATERIAL AND METHODS

The allelopathic factors for this investigation were *Syzygium aromaticum*(L.) Merr. & L.M Perry (Clove) and *Myristica Fragrans* Houtt. (Nutmeg) and the test crop was *Amaranthus cruentus* L.(Red Amaranthus).

2.1. Preparation of extract

The leaves of *Syzygium aromaticum* (clove) and *Myristica fragrans* (Nutmeg) were collected, washed and shade dried. The dried leaves were powdered and passed through a mesh sieve to remove visible plant residues. The aqueous leaf extracts were prepared by soaking 10g of dried powder in 100ml of distilled water for 48 hours. Then it is filtered and centrifuged at 3500rpm for 15 minutes. The supernatant were collected and used for the preparation of 10%, 20%, 30%, 40% solutions of both leaf extracts and the solutions were stored in refrigerator.

2.2. Experimental Treatment

The seeds for the experimental were collected by wash with 1% $KMnO_4$ and distilled water. The tests were carried out by petri dish method in sterilized Petri dishes with diameter of 9cm. 50 seeds were placed in each petri dishes lined by double layer of filter papers and treated with the four concentations of leaf extracts for seven days at room temperature. Another petridish with 50 seeds were considered as control and treated it with distilled water. The no of germinated seeds on each days of experiment were recorded and after seven days germination percentage were calculated using the equation.

$$\text{Germination \%} = \frac{\textit{Number of seeds germinated}}{\textit{Total number of seeds}} \times 100$$

3. RESULTS AND DISCUSSION

The allelopathic effect of *Syzygium aromaticum* (L.) Merr. & L.M Perry (Clove) and *Myristica Fragrans* Houtt. (Nutmeg) on germination percentage of seeds of *Amaranthus cruentus* L. is given in the Table 1. The maximum germination percentage was observed in control *i.e.* 74%. In the case of leaf extracts of *S. aromaticum* germination percentage was 42% in 10% concentration of test solution, 12% in 20% concentration, 4% in 30% concentration and 0% in 40% due to high allelopathic activity. In *Myristica fragrans* germination percentage were calculated and compared In the case of leaf extracts of *S. aromaticum* germination percentage was 54% in 10% concentration of test solution, 48% in 20% concentration, 6% in 30% concentration and 4% in 40% concentration. The germination percentage of *Amarantus cruentus* L. (red amaranthus) seeds were found decreasing by the increasing concentration of both the extracts. Both the test solutions of *Syzygium aromaticum* (L.) Merr. & L.M.Perry and *Myristica* fragrans Houtt. shows allelepathic activity but from the comparison it is clear that the leaf extracts of *Syzygium aromaticum* (L.) Merr. & L.M.Perry shows high allelopathic activity than *Myristica* fragrans Houtt. (Fig. 1)

Table 1: Allelopathic effect of *Syzygium aromaticum* (L.) Merr. & L. M Perry (Clove) and *Myristica Fragrans* Houtt. (Nutmeg) on germination percenttage of seeds of *Amaranthus cruentus* L

Concentrations	Germination %	
	Syzygium aromaticum	*Myristica fragrans*
Control	74%	74%
10%	42%	54%
20%	12%	48%
30%	4%	6%
40%	0%	4%

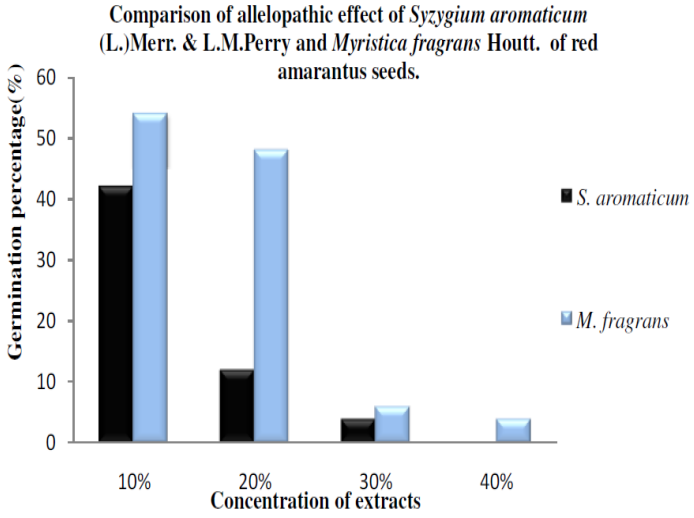

Fig. 1: Allelopathic effect of *Syzygium aromaticum* (L.) Merr. & L. M Perry (Clove) and *Myristica Fragrans* Houtt. (Nutmeg) on germination percentage of seeds of *Amaranthus cruentus* L

4. CONCLUSION

The present study explains the germination percentage of *Amaranthus cruentus* L. (Red Amaranthus) seeds were found decreasing by the increasing concentration of both the extracts. Both the leaf extracts of *Syzygium aromaticum*(L.) Merr. & L.M. Perry and *Myristica fragrans* Houtt. shows allelopathic activity but from the comparison of both the extract, *Syzygium aromaticum* (L.) Merr. & L.M Perry has high allelopathic activity than *Myristica fragrans* Houtt. in all concentrations on the seed germination of red amaranthus.

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