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ALLELOPATHIC EFFECT OF INVASIVE WEED, SYNEDRELLA NODIFLORA ON SEED GERMINATION AND SEEDLING GROWTH OF CUCUMBER AND PUMPKIN

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INTRODUCTION

To meet the food requirement of the fast-growing population of our country, we introduced several methods to improve agriculture. The introduction of pesticides in agriculture was a welcome move to control obnoxious weeds below the threshold limit and thereby reduce the yield loss. But continuous use of synthetic herbicides in heavy doses creates environment pollution and increases the number of herbicide resistant weeds. Hence, researchers should be done to find out some natural way for minimizing the dependency on synthetic herbicides. Allelopathy is a biological phenomenon by which an organism produces one or more biochemicals that influence the growth, reproduction and survival of other organisms. The biochemicals are also known as allelochemicals and can have beneficial or detrimental effects on the target organisms. Allelochemicals are a subset of secondary metabolites, which are not required for metabolism of the allelopathic organism. Allelochemicals with negative allelopathic effects are an important part of plant defence against herbivory.

Allelopathy is involved in both positive and negative interference between the plants and micro-organisms and these processes are difficult to understand without studying their ecophysiology and biochemistry. Allelopathic interactions are also thought to be an important factor in the success of many invasive weeds. Common invasive weeds *are Ageratum conyzoides* (Asteraceae), *Cassia occidentalis* (Fabaceae), *Chromolaenaodorata* (Asteraceae), *Lantana camara*(Verbanaceae), *Mimosa pudica*, (Fabaceae), *Eichhornia crassipes* (Pontederiaceae), *Grevillea robusta* (Proteaceae) etc.

Synedrella nodiflora (L.) Gaertn, a member of family Asteraceae. Synedrella weed is propagated by seeds and is usually found in frequently disturbed areas, in f, along roadsides and in crops and plantations. It grows best where the soil is moist and fertile, and where there is plenty of light. It is adapted to many environments. In India Synedrella nodiflora is distributed in following places of Maharashtra, Karnataka and Kerala.

Cuccurbita maxima also belongs to the family Cucurbitaceae, Pumpkin is one of popular vegetables among the Sri Lankans. It is native to Central America; Pumpkin is a nutritious vegetable vine plant which date back many centuries. It was one of the major ingredients of the staple diet of Native Americans and colonists and as a pain killer. Pumpkins are used in cooking and preparing desserts (candies), squash, and soups. Cucurbita maxima are a good source of protein, carbohydrates anti-oxidants, amino acids, minerals and vitamins.

The present work was conducted to study the comparative effect of aqueous extract of whole plant of *Synedrella nodiflora* on seed germination and seedling growth of *Cucumis sativus* and cucurbita maxima. Phytochemical analysis of *Synedrella nodiflora* is also studied.

MATERIALS AND MEHTODS

The present work was conducted to study the allelopathic effect of *Synedrella nodiflora* on seed germination and seedling growth of *Cucumis sativus* and *Cucurbita maxima*. belongs to the family Asteraceae. Synedrella Weed is usually found in frequently disturbed areas, along roadsides and in crops and plantations. It is adapted to many environments. It is particularly well-adapted to the partial shade found under jute and plantation crops like tea, coffee, bananas and rubber. It is quite palatable to livestock, and so is not a problem in pasture. In some countries it is fed to pigs. In India *Synedrella nodiflora* is distributed in following places of Maharashtra, Karnataka and Kerala.

2. *Cucumis Sativus*

Cucumber is a widely cultivated plant in the gourd family Cucurbitaceae. It is a creeping vine that bears cylindrical fruits that are used as culinary vegetables. The cucumber is originally from southern Asia, but now it grows on most continents. The cucumber likely originated in India. Cucumber is a frost-sensitive annual climber growing up to 2 meters. The colour of the fruit ranges from green to yellow. The cucumber fruit consists of 90% water and it is low in nutrients like fats, proteins, carbohydrates, minerals, vitamins, amino acids

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3. *Cucurbita Maxima* (Plate 1.3)

Cuccurbita maxima also belongs to the family Cucurbitaceae, Habit-Annual herb, Stem-Creeping vine, Leaves- large, palmate with a maple leaf shape, small sharp serrations along margin, Flower- flowers trumpet-like, extremely large, bright yellow with ruffled edge Fruit- fruit is a large orange pepo .

Below mentioned method is followed for both Cucumis sativus and cucurbita maxima seeds. Both seeds were collected from Agricultural University of Mannuthy. The seeds used in the study were steeped in water to determine their viability, those that floated were not used. The seeds were cleaned by washing in running tap water. Then surface sterilized with 0.1% $HgCl_2$ solution for 3-4 minutes and thoroughly washed in distilled water and dried on filter paper to eliminate fungal attack. *Synedrella nodiflora* plant was collected from fields. Whole plant is taken out and washed in running tap water. Then sterilized with 0.1% $HgCl_2$solution for 3-4 minutes and thoroughly washed in distilled water. Then the plants were crushed and grinded for extraction. The extract was filtered through “Whatman

No: 1" filter paper and stored in a refrigerator. The pure extract obtained taken as stock solution (100%) and further diluted to various concentrations such as 25%, 50%, and 75% by adding distilled water. The distilled water serving as control.

After 3 days, the germination of both the seeds was observed. Radical emergence was considered as the criteria for seed generation. Germination count in each treatment was recorded separately. The data analysed statistically. Cumulative germination percentage (C.G.P) can be calculated by the following formula.

$$CGP = \frac{GerminationValue}{Totalnumberofseedsused} \times 100$$

Germination value (G.V) is the average germination of seeds.

Three germinated seeds from each treatment and control were then transferred to polyethene bag of size (25 x 30 cm), which contains the soil from the field. Three replicates were always maintained. The polyethene bags were kept outside. These bags were moistened with respective concentration of the extract. After 10 days, the seedlings were plucked and noted the shoot and root length.

In addition to this, phytochemical analysis of secondary metabolites was also conducted. Preliminary phytochemical tests were performed by using specific reagents through standard procedures.

Results and Discussion

Effect of whole plant extract on seed germination of *Cucumis sativus*.

Concentration of the extract	Number of seeds treated	Number of seeds germinated	Germination value	Cumulative Germination percentage%(C.G.P)
25%	60	48	16	26.67
50%	60	35	11.67	19.45
75%	60	23	7.67	12.78
100%	60	9	3	5.00
Control	60	60	20	33.33

Effect of whole plant extract on shoot and root length of *Cucumis sativus*.

Concentration of the extract	Shoot length in cm (Average)	Root length in cm (Average)
25%	18.17	3.93
50%	16.67	2.7
75%	13.5	2.16
100%	10.3	1.6
Control	19.93	4.3

Effect of whole plant extract on seed germination of *Cucurbita maxima.*

Concentration of the extract	Number of seeds treated	Number of seeds germinated	Germination Value (G.V)	Cumulative Germination % (C.G.P)
25%	60	44	14.67	24.45
50%	60	30	10	16.67
75%	60	17	5.67	9.45
100%	60	7	2.33	3.88
Control	60	60	20	33.33

Effect of whole plant extract on shoot and root length of *Cucurbita maxima*.

Concentration of the extract	Shoot length in cm (Average)	Root length in cm (Average)
25%	14.13	3.33
50%	12.6	2.5
75%	10	1.93
100%	8.13	1.03
Control	16.6	4.03

Phytochemical analysis of aqueous extract of whole plant of *Synedrella nodiflora* shows the presence of Steroids, Flavonoids, Tannins, Terpenoids and absence of Saponins and Alkaloids In *Cucumis sativus* apart from control 25% concentration shows the high germination value 16 and 100%

concentration shows the low germination value 3. In the 25% concentration shows the high shoot length and root lengthvalue 18.17 and 3.93.In 100% shows low shoot length and root length value 10.3 and 1.6 respectively. In *Cucurbita maxima*. Apart from control 25% concentration shows the high germination value 14.67 and 100% shows the low germination value 2.33.Apart from control 25 % concentration shows the high shoot length and root length value 14.13 and 3.3.In 100 % concentration shows the low shoot length and root length value 8.1 and 1.03 respectively.*S.nodiflora*, whole plant extract have more inhibitory effect on seed germination and seedling growth of *Cucurbita maxima* than *Cucumis sativus*. This may be due to the presence of allelochemicals in S.nodiflora have more effect on *cucurbita maxima*, or the Allelopathic interaction between both plants become more effective.

Inhibition of seed germination at higher concentrations of plant extract was observed by many workers such as Terfera(2002), Al-Robai (2007), Abu-Romman (2010) etc. Padly *et al.*, (2002) observed suppression in germination and seedling growth of *Eleusine coracana* by yellow leachates of Eucalyptus. Leaf leachates of *Synedrella nodiflora* at various concentrations tested inhibited seed germination and seedling growth of tomato and brinjal. The germination percentage was found to decrease with an increase in concentrations. At the same time the shoot length and root length are also found to be decrease with increase in concentrations. Phytochemical analysis of various plants are conducted and presence of Saponins, Steroids, Flavanoids , Terpenoids, Tannins are observed by many workers such as Victor A.Y.,Barku*etal* (2013) It is reported that presence of Tannins, Flavanoids, and Cardiac glycosides are found in these plants and the present findings are agreement with the above observations.

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