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ALLELOPATHIC IMPACT OF *Digera Muricata* On SEED GERMINATION AND GROWTH OF GROUNDNUT (*Arachis Hypogaea*)

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Abstract: Five aqueous extract levels (0, 25%, 50%, 75%, and 100%) were used to examine the impact of *Digera muricata* leaf aqueous extract on *Arachis hypogaea* seed germination and growth. This experiment was carried out at the Sant Ganinath Government P.G. College Botany Lab in Muhammadabad Gohana Mau, Uttar Pradesh, India. Groundnut seeds were grown in petridishes that contained pure water and *Digera muricata* leaf extract at 25%, 50%, 75%, and 100%separately. After ten days, the percentage of seeds that germinated was assessed, and the groundnut's shoot length and dry weight were measured at 60DAS. At 75% leaf extract, the greatest inhibition of seed germination was 43.67%; at 100% leaf extract, the maximum inhibition of shoot length was 53.2%); and at 100% leaf extract, the maximum inhibition of dry weight was 65%.

Index Terms **- Allelopathic,Allelochemicals, *Digera muricata, Arachis hypogaea*.**

I. INTRODUCTION

An Australian scientist, **Hans Molisch,** gave the term ‘allelopathy’ in **1937**. Molisch, also known as the father of allelopathy. The term allelopathy is made of two word – ‘allelon’ and ‘pathos’, both of which are greek words in origin. Molisch says that ‘allelon’ means ‘mutual’ and ‘pathos’ means ‘suffering’.

Singh (2021a), observed allelopathic effect of goat weed on chick pea and black gram and he compared inhibitory effect of goat weed on growth and development of chick pea (*Cicer arieticum*) and black gram (*Phaseolus munga* L.).

After Molisch, at different times, different scientists defined allelopathy, such as Whittaker and Freeny, E. Leon Rice, and others.Allelopathy is defined as any direct or indirect, advantageous or detrimental effect that one plant has on another by the release of biochemicals into the environment **(Rice, 1984).**In agroecosystems, allelopathy is crucial because it results in a variety of interactions between crops, weeds, and trees. These interactions typically cause harm to the receiving plants while favoring the donor.**(H.P. Singh et al. 2008).** When two or more types of plant species are grown in the same field Simultaneously, the development of any single plant species is inhibited by the releasing of some chemicals from the other species; this phenomenon is known as allelopathy, and the biochemicals that are released from the other species are known as allelochemicals.

The rate of the effects of allelochemicals depends on the time, amount of the allelochemicals, etc. Allelochemicals come under the secondary metabolites. Metabolites are the chemical compounds that are released during metabolic pathways. These metabolites are plant-origin chemicals. On the basis of the origin, metabolites have two major groups—primary and secondary metabolites. Secondary metabolites have different types of groups.

Groundnut is known as the “king of oilseeds” and also poor’s almond. China is largest groundnut production country of the world. Gujrat, Rajasthan, Madhya Pradesh, Karnataka etc are major groundnut cultivated states of India. In India, Gujrat is largest groundnut cultivated state. About half of production of Groundnut in India,are Andhra Pradesh and Gujrat.

Groundnut known by different names at different locality as Mungphali, Chinibadam, Nelakedala etc. Groundnut is originated in South America. At present time it is widely cultivated in many other countries such as China, India, Nigeria, Myamar, Indonesia, USA and other countries.
Digera muricata is also known as **false amaranth.** It is an annual herb, about 32 to 85 cm in height. The leaves of it are simple and show alternate phyllotaxy. Flowers are small and spike inflorescences. This plant has medicinal values such as anticancer, antidiabetic, antibacterial, etc. It is used in traditional medicinal systems. Extracts of it have many primary metabolites (carbohydrates, proteins, lipids, etc.) and secondary metabolites such as saponins, tannins, flavonoids **(P.Mathad and S.R. Mety, 2010**).
Digera muricata is an annual herb growing upto 20-70 cm tall. It is an important medicinal herb belongs to Amaranthaceae family and found as a weed throughout India. This plant is utilized as a sweet-tasting herb and is remarkably aromatic. Its principal chemical components include amino acids, proteins, lipids, phenols, carbohydrates, and chlorophylls **(Abdul Ghaffar, 2019**).

Flowers are without hairs and mostly light pink or carmine red in color and with long pedicels. July to September is the best time for good growing. Leaves of *Digera muricata* have a large amount of protein.

Numerous pharmacological effects, such as antibacterial, anticancer, antioxidant, hepatoprotective, anti-testicular, anti-inflammatory, and renal protection, were demonstrated by crude extracts and bioactive

compounds. Additionally, *Digera muricata*has been used in nanotechnology to enhance the biological efficacies of nanoparticles by biogenic synthesis.

It is utilized in traditional and folk medical systems it has many metabolites such as of alkaloids, flavonoids, phenols, tannins, terpenes and saponins. (**P.Mathad and S.R. Mety, 2010**)

II. METHODS AND MATERIALS

POT CULTURE EXPERIMENT -

The present study was conducted at the Botany lab, S.G.Government P.G. College Muhammadabad Gohana, Mau, U.P., India.

Martina T.V. Adeleke (2016), experiment effect of *Allium sativum* extract on the growth and production of cowpea and groundnut and compare the allelopathic effect of *Allium sativum* extract between cowpea and groundnut.

The fresh leaves of *Digera muricata*was collected from roadside of college, washed with water, cut into small pieces and then soaked into water for 48hrs. After 48hrs, leachates was filtered using filter paper as result stock solution prepared.Using water and stock solution, 25%,50% and 75% concentration of leaf extract prepared. 30cm diameter plastic pots was use for the experiment. In each pot, 3kg dried soil fill up and in each pot 10 healthy seeds of groundnut sown. The Control pots were irrigated with distilled water. After seed sown, for irrigation aqueous of *Digera muricata* used. For seed germination experiment, data were collected 10DAS day and for stem height and dry weight, data collected 60DAS.

III. OBSERVATION AND RESULT

Effect of *Digera muricata* leaf extract on seed germination

At all concentrations of *Digera muricata* leaf extract, seed germination of groundnut was inhibited. At control, 100% seed germination means no inhibition occurs. At 25% leaf extract, 2 % seed germination is inhibited; at 50% leaf extract, 10% seed germination is inhibited; at 75% leaf extract, 43.67% seed germination is inhibited; and at 100% leaf extract, only 39.55% seed germination is inhibited(Table1, Fig1)

A maximum of 43.67% seed germination was inhibited by 75% leaf extract of *Digera muricata*.

Effect of *Digera muricata* leaf extract on shoot length

At 60 DAS (leaf extract), at 25% leaf extract, 6.6% shoot length was inhibited; at 50% leaf extract, 19.5% shoot length was inhibited; at 75% leaf extract, 34.8% shoot length was inhibited; and at 100% leaf extract, 40.9% shoot length inhibition of *Arachish ypogaea* was seen.

Maximum of 40.9% shoot length was inhibited by leaf extract of *Digera muricata* at 100% concentration.

In present work, it is observed mostly that the concentration of aqueous leaf extract increased, the percentage of seeds that germinated decreased. Similar result was also observed by many researchers **(Dongre and Singh,2007;Dongre and Singh,2011; Singh and Yadav, 2025;Belel and Rahimatu, 2012).**

TREATMENT (%)	SEED GERMINATION (%)	SHOOT LENGTH (IN CM)	SHOOT DRYWEIGHT (IN GM)
Control	100.00 (0)	22.0	02.50
25	98.00 (-2)	20.53(-6.6)	01.0(-60)
50	90.00 (-10)	17.70(-19.5)	00.9(-64)
75	56.53 (-43.67)	14.33(-34.8)	0.81(-67)
100	60.50 (-39.55)	13.0(-40.9)	0.75(-70)
CD at 5%	1.8	4	0.62

Data is parentheses indicate% deviation from control.

Table. 1. **Effect of aqueous leaf extract of *Digera muricata on* seed germination, shoot length and shoot dry weight of groundnut in pot culture**

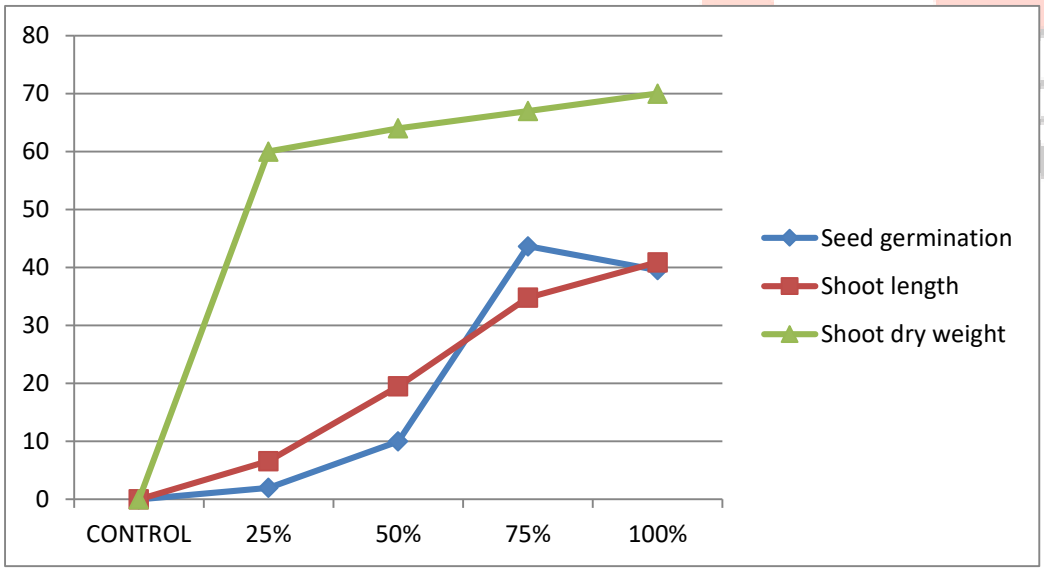

Figure 1. Effect of leaf extract of *Digera muricata* on seed germination, shoot length and shoot dry weight of groundnut

Effect of *Digera muricata* leaf extract on shoot dry weight

At 60 DAS (leaf extract), at a control, no percentage inhibition occurs. At 25% leaf extract, 60% shoot dry weight inhibition; at 50% leaf extract, 64% shoot dry weight inhibition; at 75% leaf extract, 67% shoot dry weight inhibition; and at 100% leaf extract, 70% shoot dry weight inhibition of *Arachis hypogaea is* seen. Maximum of 70% shoot dry weight was inhibited by leaf extract of *Digera muricata* at 100% concentration.

IV. DISCUSSION

Before many researchers worked on *Arachis hypogaea* using different weeds (**ZakariAbdurahman et al., 2023; Eba M. Sorecha and BirhnuByissa, 2017; Yadav and Singh,2025)** observed different results. At different concentrations, percentage inhibition in different parameters varies because of the amount of allelochemicals.

The Allelopathic impact of leaf leachates of other related weed on seed germination and seedling growth of Green gram, Black gram, Wheat, Pea, Maize, Chickpea etc are known **(Dongre *et al.*, 2010; Singh, 2021b; Singh, 2021c).**

In my experiment, maximum percentage seed germination seen at 75% leaf extract but maximum shoot length and shoot dry weight inhibition seen at 100% leaf extract of *Digera muricata*.

V. CONCLUSION

From the study it can be concluded that aqueous leaf extract of *Digera muricata* had greater inhibitory effect on germination rate of groundnut at 75% leaf extract solution. Maximum inhibition in shoot length and shoot dry weight at 100% concentration leaf extract of *Digera muricata*. The leaf of *Digera muricata* has potential to inhibit the seed germination and seedling growth and dry weight of groundnut plants due to the presence of phenolic compound. Increase in concentration of leachates was invariably associated with further decrease in germination of test cultivars, irrespective of weed species.

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