World Journal of Pharmaceutical and Life Sciences
WJPLS
www.wjpls.org
SJIF Impact Factor: 7.409

BIOASSAY OF AQUEOUS LEAF EXTRACT ON GROUNDNUT

Patil P. D.[1], Darade Arya M.[2] and Darade M. S.[1]*

[1]Department of Botany, Government Vidarbha Institute of Science and Humanities, Amravati-444604.
[2]Department of Biotechnology, Shri Shivaji College of Agricultural Biotechnology, Amravati – 444603.

***Corresponding Author: Darade M. S.**

Department of Botany, Government Vidarbha Institute of Science and Humanities, Amravati-444604.

Article Received on 12/03/2025 **Article Revised on 02/04/2025** **Article Accepted on 21/04/2025**

ABSTRACT

The aqueous extract of *Pistia stratiotes* affects on growth parameters of *Arachis hypogaea*. The leaf extract of *Pistia* was prepared into different concentrations like 1 %, 2 %, 4 % and 6 %. The experiment was conducted on groundnut variety called as Mahabeej. The seeds of groundnut were soaked in extract of pistia for one hour. The maximum seed germination (100 %) was recorded in 1 % over the control. The minimum seed germination (46.66 %) was noted in 6 %. The maximum seedling height (12.48 cm) was noted in 1 % and minimum height (4.13 cm) in 6 % concentration. The maximum root length (5.14 cm) was recorded in 1 %. The shoot length (7.34 cm) noted in 1 % concentration. The biomass increase is observed in 1 % concentration of extract over the control. The fresh weight of seedling was recorded maximum (1.78 gm) in 1 % concentration. The decrease in dry weight (0.146gm) was recorded in 6 %. The maximum (336.2 gm) vigour of seedlings recorded in control. It is observed that as concentration increases then there is decrease in growth parameters. The increase in concentration becomes inhibitory for growth of groundnut.

KEYWORDS: *Pistia stratiotes*, Aqueous extract, *Arachis hypogea*, Growth, Biomass.

INTRODUCTION

The seed germination is a critical stage in the life cycle of plants. The germination of seed starts with physiological process of imbibitions of water in dry seeds. The optimal germination of seeds lead to successful establishment and growth of whole plants as well as yield. The Allelopathy has received greater attention from researchers and farmers worldwide. The plant generally release certain substances into their surrounding through leaching, root secretion and degradation of residue. The released substances may have direct or indirect effect on the life of plant. The secretion of substances may be beneficial or harmful to surrounding plants. The allelopathy is believed to play an important role in biological invasion. The detrimental effect of weeds and crops is a phenomenon that one cannot be hundred percent to separate physical competition than allelopathy.[1] The most weeds have allelochemicals which adversely affect seed germination and seedlings growth of any agricultural crop. The chemicals with allelopathic potential are generally present in almost all plants in many tissues which may be released in broad quantities in surrounding region and affect neighbouring plant under specific conditions.[2] The plant *Pistia stratiotes* is a plant, commonly called as water Lettuce which is an aquatic macrophyte.[3] The water Lettuce composed of minerals like nitrogen, phosphorous and potassium.[4] The *Arachis hypogaea* is called as groundnut which is an important oil yielding agricultural crop, grown widely in different parts of the world. The groundnut seeds are commonly called as poor man's nut because it contains edible oil and proteins. The seed contains 44 % to 56 % edible oil and 22 % to 30 % protein. The groundnut seeds are rich source of minerals like phosphorus, calcium, magnesium, potassium and vitamins.[5][6]

Considering the importance of water lettuce and groundnut, present research is aimed and attempted to assay the effect of aqueous extract on enhancement of growth parameters in groundnut.

MATERIAL AND METHODS

Study site

The study site is geographically positioned approximately 20.9320 ^{0} N and 77.7523 ^{0} E Maharashtra state in India The institute is situated at an elevation of about 343 meters above sea level aligning with the average elevation of Amravati city.

Collection of Sample

The experimental plant *Pistia stratiotes L.* were collected from the campus of educational institute G.V.I.S.H. Amravati. The seeds of *Arachis hypogaea* were collected from Krishi Seva Kendra located in Amravati. The sample selected were healthy plant with grey green leaves in the form of rosette arrangement. The plant possesses short stems and leaves. The leaves were spongy near the base. They were fan-shaped to slightly spoon shaped borne on very short stalks. They leaves were spongy as it contain air pockets which gives buoyancy to the plant in water.

Aqueous extract

The sample collected from the campus field was brought in the laboratory. It was then shed dried for two days. The extract of sample leaves were prepared with the help of water. Different concentrations like 1%, 2%, 4% and 6% were prepared by dissolving dried powder in 100 ml of water. The mixture were shaken thoroughly on rotary shaker and allowed to settle down. The mixture was then filtered through Whatman No. 1 filter paper. The concentrations prepared were stored in closed mouth small conical flasks. The conical flasks were labelled as per the concentration and used further for analysis.

Seed germination percentage

Total 10 seeds of groundnut were taken and soaked for one hour in extract as per concentration grades. They were then placed on wet blotting paper in each petriplate. The control was kept for comparison purpose. The control does not contain aqueous extract of sample plant. The petriplates were agitated on rotary shaker The seeds those initiated radical and plumule they were treated as germinated seeds. The percent seed germination was calculated with the help of following formula.

$$\% \text{ Seed germination: } \frac{\text{Number of seeds germinated}}{\text{Total seeds tested}} \times 100$$

RESULT AND DISCUSSION

In the present investigation effect of aqueous extract of *Pistia* was tested on seeds of groundnut plant. Different concentrations of extract were prepared and seeds were treated in each grade. The growth parameters like seed germination percentage, seedling height, root length and shoot length, biomass and seedling vigour were assayed and result are recorded. The results obtained were significant and important. The minimum growth were recorded in 6 % concentration to that of control. The seed germination capacity was found enhanced only upto 2 % extract. At higher concentration the inhibition of growth is noted. On the basis of results obtained, it can be concluded that, as the concentration of extract increases then there is decrease in growth of seeds. The similar experiments were carried out by many researchers. The pot culture experiments were conducted to assay the effect of extract. The results indicating that highest germination rate is observed at low concentration of aqueous extract and concentration promoted seedling growth of many experimented crops. The rise in concentration inhibited growth of plants.

Table 1: Effect of aqueous extract on growth Arachi hypogaea ver. Mahabeej.

Sr. No.	Concentration of extract	% Seed germination	Seedling height (cm)	Root length (cm)	Shoot length (cm)
1	Control	100	10.79	3.54	7.25
2	1%	100	12.48	5.14	7.34
3	2%	93.3	9.06	3.05	6.01
4	4%	73.33	7.01	2.40	4.61
5	6%	46.66	4.13	1.58	2.55

The allelopathic effect of extract of *Flaveria bidentis* on seed of certain plants like Shanghai green, Barnyard grass and wheat was assayed. In the experiment it is found that extract of *Flaveria bidents* inhibited the germination rate, seedling height, root length, chlorophyll content, fresh weight and dry weight of plant. The increase in concentration enhanced inhibitory effect on growth of plant.[7] similar results are found in *Arachis hypogea* in which the inhibitory effect was noted at 6% concentration. There are many researchers who assayed the effect of aqueous extract of *Pistia stratiotes* on seed germination of wheat.[8] The aqueous extract usually contains glycosides, flavonoids and phytosterols. The Leaves contains vitamins, stigma-sterol, cyaniding-3-glucoside, luteolin-7-glucoside. The chemical constituent may affect on the seed germination and growth parameters of plant. The reduction in root length was observed at 4 % and 6% sequentially. There are researchers they conducted bioassay with the help of leaves of *Terminala belirica, Terminalia chebula, Ocimum gratissmu and Terminalia arjuna*. The bioassay was conducted on *Labal niger* and v*igna unguiculata*. They found that aqueous extract has reduced and delayed the rate and proportion of seed germination, shoot length and root length over the control. The various growth parameters were found enhanced due to extract over the control.[9] The extract of *Pistia pastratiotes L.* has stimulated seed germination and root growth of *Sorghum*. The highest reduction in seed germination was observed in Maize by many researchers. The inhibitory effect was observed with increase in concentration of extract. The biomass of seedling was reduced at 6% concentration. The reduction in fresh weight of shoot was observed with increase in concentration (Table2). The maximum reduction in growth parameter was observed at 6%.There is found increase in dry weight of *Arachis hypogaea L.* to that of control in 1 % concentration to that of control.

Table 2: Effect of aqueous extract on biomass of *Arachis hypogaea ver.* Mahabeej.

Sr. No.	Concentration of extract	Fresh weight of seedling(gm)	Dry weight of seedling(gm)	Vigour of Seedling (gm)
1	Control	1.66	0.332	336.2
2	1%	1.78	0.356	521.3
3	2%	1.33	0.266	311
4	4%	1.06	0.212	244.6
5	6%	0.73	0.146	160.5

The biomass was found increased in 1 % (0.356 gm) over the control. As the concentration increased then there was decrease in dry weight of seedling. In terms of seedling vigour the biomass of seedling was recorded 1 % concentration and it was found decreased at 6 %.The highest concentration of extract showed reduction in vigour index as compared to control. There are researchers they conducted experiment on *Mentha piperita* aqueous extract. The aqueous extract of *Mentha piperita* has shown significant seed germination percentage and biomass. The experminets on *Beta vulgaris L., Cucumis sativum L., Lactuca sativa L., Lupinus letcus L., Phaseolus vulgaris L. etc.*has shown significant results. The different concentrations of extract affected growth parameters of test plants. The aqueous extract inhibited growth of plants. The stimulating effect on seedling growth on bean and maize were recorded at different concentrations of aqueous extract by many researchers.

CONCLUSION

The water lettuce has high mineral nutrient contents. The minerals are necessary for the growth of plants. The compost prepared from *Pistia* can be a promising way to improve physical and chemical properties of the soil in view to enhance overall plant growth. The organic manure is helpful for overall growth of plant. The farmers may use organic manure to enhance growth of agricultural crops. The farmers can avoid use of chemical fertilizer because the chemicals leads to environmental and health hazards. The plant growth parameters can be changed depending upon the concentration of aqueous extract over the control. It can be concluded that as the concentration of extract increases then growth parameters decreases. The increase in concentration promotes inhibitory effect on growth of plant. The *Pistia stratiotes*, can be used as a bio fertilizer as it contains rich mineral contents. The compost manure prepared can be ecofriendly alternative solution to chemical fertilizers. The performance of growth parameters can be affected due to quality of seeds. The aqueous extract of *Pistia* at optimum concentration can boost the growth parameters of plant because of mineral richness.

REFERENCES

1. Batish, D. R., Pal Singh, H., Kohli, R. K., Kaur, S., Saxena, D. B., & Yadav, S. Assessment of phytotoxicity of parthenin. Zeitschrift für Naturforschung C, 2007; 62(5-6): 367- 372.
2. Putnam, A. R. Allelochemicals from plants as herbicides. Weed technology, 1988; 2(4): 510-518.
3. Howard, G. W., & Harley, K. L. S. How do floating aquatic weeds affect wetland conservation and development? How can these effects be minimised?. Wetlands Ecology and Management, 1997; 5: 215-225.
4. Kilinc, A., Bilgin, A., Yalcin, E., & Kutbay, H. G. Macroelement (N, P, K) contents of Arum euxinum R. mill during vegetative and generative growth phases. Pak. J. Biol, 2005; 8: 267- 272.
5. Vinothini, N., Vijayan, R., & Umarani, R. Studies on flowering pattern in relation to seed filling and seed multiplication rate in groundnut (Arachis hypogaea L.). Int. J. Curr. Microbiol. App. Sci, 2018; 7(9): 3321-3328.
6. Kaba, J. S., Kumaga, F. K., & Ofori, K. Effect of flower production and time of flowering on pod yield of peanut (Arachis hypogaea L) genotypes. IOSR Journal of Agriculture and Veterinary Science, 2014; 7(4): 44-49.
7. Dai, L., Wu, L., Zhou, X., Jian, Z., Meng, L., & Xu, G. Effects of water extracts of Flaveria bidentis on the seed germination and seedling growth of three plants. Scientific Reports, 2022; 12(1): 17700.
8. Gul, B., Saeed, M., Khan, H., Khan, M. I., & Khan, I. Impact of water hyacinth and water lettuce aqueous extracts on growth and germination of wheat and its associated troublesome weeds. Applied Ecology & Environmental Research, 2017; 15(3).
9. Balaram Roy, B. R., Sarker, B. C., Shefali Akter, S. A., Das, S. R., & Ali, M. Effects of aqueous extract of some herbal plant leaves on seed germination and seedling growth of bean (Lablab niger) and borboti (Vigna unguiculata), 2014.