



## IMPACT OF WOLFFIA ARRHIZA EXTRACTS ON GROWTH BEHAVIOUR OF RAJMASH PLANT

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### ABSTRACT

*Wolffia arrhiza* plants are thalloid, boat shaped one to three millimeters long colonies, rarely consist of more than three visible fronds. The impact of growth promoting substances of *Wolffia arrhiza* on Rajmash variety IPR 96-4(Amber) plant has been studied by pre-soaking seed treatment. The observation show that growth and development of plant height, number of branches per plant and number of leaves per plant is markedly stimulated with 5 percent extract and result are highly significant statistically.

**KEYWORDS:** *Wolffiella floridana*, Rajmash variety IPR 96-4 (Amber), Water Extract, Ether Extract

Out of variety of aquatic plants, duckweeds comprise simplest and smallest of flowering plants relegated as botanical curiosities. They have been described as plants without known economic significance in the beginning but now their relevance as fish and duck food has attracted attention. Nowinska and Rzeska (1972) pointed out the importance of *Wolffia arrhiza* as a poor man's food for polish, Burmese and Thai people. They reported on estimated yield of 265 tones of green matter per hectare and 2080 k/gm of protein per hectare. There are also reports of endogenous gibberellins in floating plants and torsions of *Wolffiella floridana* (Pieterse, Bhalla and Sabharwal (1971). Duckweeds landscapes of Kanpur and mapping of wetlands Interalia significance reported by Tiwari (2000 & 2002). Costanza *et al.* (2014) pointed changes in the global value of ecosystem services. It is known that gibberellins have an effect on dormancy and as such duckweeds may prove useful as experimental material for studying dormancy and also serve towards extraction of growth substances for utilization in agriculture, Duckweeds have been found to be unusually suited for biochemical studies and plant nutrition (Reid and Bielecki 1970). *W. arrhiza* extracts on vegetative growth (Tiwari 2003) and yield of lentil extensively studied (Tiwari and Shukla 2007) and utilization of *W. arrhiza* extracts for improvement of dry weight and number of nodules in lentil crop reported by Tiwari (2017). Effect of water deficit and micronutrients foliar application on the productivity of wheat plant studied (Kassab *et al.*, 2004). The overwhelming usage of lemnoids as experimental organisms in morphogenetic, physiological biochemical and genetically research has opened up wide vistas for exploration and enquiry.

### MATERIALS AND METHOD

The experimental material was collected from nature in healthy condition and plants of equal size and shape were carefully selected. Selected plants were vigorously washed in tap water to remove adhering debris and algae. Finally, the material was washed with distilled water and cultured in thoroughly acid and distilled water washed rectangular glass containers 2.5' long, 1' broad and 1.5' deep containing culture medium. Medium with organic nutrients like sugars, coconut milk and soil extracts were found unsuitable as they either supplemented to the growth of contaminants or bore unknown composition. Culture medium as modified and suggested by Pandey (1979) with following composition was selected for bulk use for maintenance of stock cultures. The medium was changed for nightly to avoid exhaustion of nutrients in the medium.

Sidewall of glass containers were covered to the brim of medium with black paper to avoid and minimise algal contamination and curtail light availability to roots of *W. arrhiza* grown.

In stock cultures, fronds were acclimatized before their use as inoculum in experimental work. The stock cultures were maintained at a temperature of 25 to 30°C with a pH range of 6.5 to 7.5. The cultures were placed in North- South direction near large size glass windows of laboratory and were grown under normal sunlight.

Studies on utilization of *W. arrhiza* in agriculture were made with special reference to their

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use for obtaining extracts containing growth substances. Rajmash variety IPR 96-4 (Amber) were selected to study the effect. Genetically tested seeds were obtained from Indian Institute of Pulse Research, Kanpur. Seeds of approximately same size and weight were selected for experiment.

*Wolffia arrhiza* was chosen as experimental material because of its quantitative abundance and growth in the district. Experimental material grown in stock cultures as described earlier was used for preparation of *Wolffia arrhiza* extracts.

The extractions of *W. arrhiza* were made in water and ether separately. As ether is injurious to plant growth it was allowed to evaporate and growth-promoting substances were suspended in water. Five millilitre of *Wolffia arrhiza* by volume was taken and ground in a clean porcelain mortar with water or ether. In case of water extract sufficient water was added to make it 100 ml to have a five percent extract. In case of ether extract ether was first allowed to evaporate and the suspension was then made to 100 ml in distilled water. 1, 2, and 5 percent extracts were made by further dilutions with distilled water. Fifty seeds were soaked in sterilized petridishes in different concentrations (1, 2 and 5 percent) of water and ether extracts of *W. arrhiza* and distilled water (control) for 24 hours.

The effect of treatments was studied under field earthen pots conditions in the garden beds laid for specific purposes with dimensions of 8 feet in breadth and 10 feet in length. Each bed was sown with 3 rows containing 9 seeds spaced 25 cm in rows 60 cm apart. Thus, total number of plants grown in each bed was 27 out of which 25 were selected for observations. Two beds of each treatment and normal untreated control were laid to raise 50 replicates. Seeds of Rajmash variety IPR 96-4 (Amber) were soaked for 24 hrs in various concentrations of extracts.

The data was analysed statistically following analysis of variance method at 5 percent error probability for testing the significance of the effect of treatments. Results of statistical analysis are entered in respective observation tables.

## RESULTS

### Effect of 24 Hours Ether Extracts on Vegetative Growth

Height of Plant:

Observation given in table-1 indicate that 5 percent extract promotes height of plants to the maximum extent is observed throughout the duration of the crop.

Statistical analysis of the data, however, suggests that observed effect is significant at 5 percent error probability.

#### Number of Branches

A perusal of results given in table-1 shows beneficial effect of 5 percent ether extracts. The stimulatory effect is observed throughout the duration of the crop.

Statistical analysis of the data, however, suggests that observed effect is significant at 5 percent error probability.

#### Number of Leaves

Observation given in table-1 show stimulatory effect of 5 percent ether extracts. The beneficial effect is observed throughout the duration of the crop.

Statistical analysis of the data, however, suggests that observed effect is significant at 5 percent error probability.

### Effect of 24 Hours Water Extracts on Vegetative Growth

Height of plant:

Observation given in table-2 indicate that 5 percent water extract promotes height of plants to the maximum extent is observed throughout the duration of the crop.

Statistical analysis of the data, however, suggests that observed effect is significant at 5 percent error probability.

#### Number of Branches

A perusal of results given in table-2 shows beneficial effect of 5 percent water extracts. The stimulatory effect is observed throughout the duration of the crop.

Statistical analysis of the data, however, suggests that observed effect is significant at 5 percent error probability.

#### Number of Leaves

Observation given in table-2 show stimulatory of 5 percent effect of 5 percent water extracts. The beneficial effect is observed throughout the duration of the crop.

Statistical analysis of the data, however, suggests that observed effect is significant at 5 percent error probability.

**Table 1: Effect of 24 hours pre soaking seed treatment with *Wolffia arrhiza* extract on vegetative growth of Razmash plant**

ETHER EXTRACT												
Days	Plant height (cm)				Number of branches per plant				Number of leaves per plant			
	C	1	2	5	C	1	2	5	C	1	2	5
30	8	8.3	8.5	8.6	3.0	3.2	3.6	3.8	17	19	21	22
45	14	14.1	14.4	14.5	4.6	4.7	4.8	5.1	24	24.1	24.4	24.7
60	18	18.2	18.3	18.6	4.9	5.0	5.2	5.6	35	35.2	35.4	35.6
75	23	23.4	23.8	24.7	5.2	5.1	5.4	5.7	41.1	41.1	41.2	41.3
C.D. = 0.32071 Difference 5% ether extract control=1.7					C.D. = 0.22678 Control=0.5				C.D. = 0.34450 Control=0.3			

**Table 2: Effect of 24 hours pre soaking seed treatment with *Wolffia arrhiza* extract on vegetative growth of Razmash plant**

WATER EXTRACT												
Days	Plant height (cm)				Number of branches per plant				Number of leaves per plant			
	C	1	2	5	C	1	2	5	C	1	2	5
30	8	8.3	8.4	8.7	3.0	3.4	3.8	3.9	17	20	22	24
45	14	14.3	14.5	14.8	4.6	4.7	4.9	5.2	24	24.3	24.6	24.9
60	18	18.1	18.3	18.7	4.9	5.0	5.3	5.8	35	35.4	35.6	35.7
75	23	23.8	24.3	25	5.2	5.4	5.6	5.9	41	41.1	41.3	41.4
C.D. = 0.47486 Difference 5% ether extract control=2.0					C.D. = 0.32071 Control=0.7				C.D. = 0.22678 Control=0.4			

## DISCUSSION

Security of wetlands and its agricultural and socio-economical significance reported by Tiwari et.al.(2009). Nutritive value of Indian foods studied by (Gopalan, Ramasastri and Balasubramanian,2004).

Influence of *W. arrhiza* extracts of mature Rajmash plant growth have shown promising results. 5 percent ether extract under 24 hrs pre-soaking exercised increase in plant height 6.88%, number of branches 8.77, number of leaves 0.72%. Treated plants were more livelier and intensely green. Increased plants branching is paramount importance as it is interlinked with production of pods and consequently the yield.

Likewise 24 hrs treatments with 5 percent water extract of *W. arrhiza* showed increases of percent over control on plant height 8.00%, number of branches 11.86%, number of leaves 0.96%, respectively. An increase of percent under effect of treatments with 5 percent water extract was observed on plant height, number of branches, number of leaves, respectively.

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