



# REPORT

A project was undertaken by +3 3<sup>rd</sup> year students of Department of Botany on "Azolla for sustainable Agriculture" under the guidance of Dr. Anjali Kumari Dash, HOD Botany for the academic year 2022-23. 16 numbers of students have been participated in this project work. They have worked for 3 months to complete this project. They cultivated Azolla by using cow dung, mineral mixture, soil and water in a tank by maintaining the temperature of the tank 20<sup>0</sup>C to 30<sup>0</sup>C with water pH 4-7. It took 2 months to convert it in usable form. They have taken two same sized healthy plants of *Oryza sativa* for their experiment and applied Azolla to one plant of each species and kept for observation for about 15 days. After 15 days it was observed that the plants with Azolla had better noticeable growth than the plants without Azolla.

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## Abstract

**Azolla** is a water fern that floats on the surface of fresh water ponds ,rivers and flooded fields in the tropics and sub tropics .It has several pharmacological effects and can be used as anti-oxidant ,immune–stimulating,hepato-protective and phytoremediation ,bioremediation and also as nutritious material.

We 9 students of our botany department started cultivating azolla by using cow dung, mineral mixture, soil and water in a tank.Temperature of tank was 20<sup>c</sup>-30<sup>c</sup> and water PH 4-7.It took 2 months to convert it in usable form. Then we took 4 same sized healthy plant of *Oryza sativa* and then the cultivated azolla was applied to 2 plant .The plant was left for 15 days .Then it was observed that the plant in which the azolla was applied had a noticable growth.

## INTRODUCTION

The study area is located near the Pattamundai town. Pattamundai is located at 20.57°N 86.57°E & 22 km from the Bay of Bengal in the Utkal Plains, at an elevation of 6 m from sea level. Pattamundai is a flat, low-lying delta region in the Lower Mahanadi River basin. The Brahmani river divides it from the Aul block. The Pattamundai Canal running from Cuttack to Alva Lock (80.5 km) constructed by the East India Company during the mid 19<sup>th</sup> century, is a major irrigation canal passing through the city. The river Brahmani is passing by the side of this municipality. The soil with high organic matter 5-15 % formed in temperate and cool humid region and low (1-3 %) in soil arid and semi-arid zones. The average rain-fall in the year was recorded 100-170 cm. while temperature between 20°C-38 °C. During winter, temperature was 10°C-25°C

The college was established in the year 1970 at by the collective efforts of the people of the locality who wanted higher education to come to their door steps.

This college is the 2<sup>nd</sup> largest college of the district upholds the purpose for which it was founded away back in the late sixties. This college is affiliated to Utkal university which is the premier university of Odisha provides the scope to the students to

pursue their dreams and become successful in life .This college offers higher secondary and undergraduate course in Science, Commerce and Arts. As per the National assessment and accreditation council it holds 'B' grade.

This college has excellent infrastructure, security and facilities. College provide us sports , cultural activities and everything .This college is known for its educational facilities like smart class rooms ,seminar hall ,advance lab , library etc.

In this local area, farmers are using chemical Fertilizer which is affecting useful organism and decreasing soil texture and overall soil quality offield. So we 9 students of our department decide to make a project on Azolla under the guidance of Dr. Anjali Kumari Dash (HOD of Botany department) and to promote bio fertilizer in local areas for both commercial and environmental benefits.

Azolla is a genus of 7 species of aquatic ferns in the family Salviniaceae.They are extremely reduced in form and specialized , looking nothing like other typical ferns but resembling duckweed or some mosses.

Azolla is naturally found in ponds ,ditches and wetlands of warm temperate and tropical region throughout the world .Its requires light for photosynthesis and grows well in partial shade .Generally,

Azolla needs 25-50% of full sunlight for its normal growth. Water is the basic requirements for growth and multiplication of Azolla is extremely sensitive to lack of water. Maintenance of adequate water level is essential.

The species vary in their requirements of ideal temp. in general, the optimum is 20<sup>0</sup>c -30<sup>0</sup>c. Temp. above 37<sup>0</sup>c will seriously affect the multiplication of azolla. The optimum relative humidity is 85-90%. The optimum PH is 5-7. Too acidic or alkaline ph has an adverse effect on this fern. Azolla absorbs nutrients from water. Through all elements are essential, phosphorous is the most common limiting element for its growth. About 20ppm of phosphorous in the water is optimum. Micronutrient application improve the multiplication and growth.

In rice field, Azolla is used as dual cropping and green manuring. It is also used as cattle feed for pig, goat, poultry and other livestock. Azolla has several pharmacological effects and it is also used as antioxidant, immune-stimulating, hepatoprotective, bioremediation and also nutritious material. Azolla contains vitamin B12, Betacarotene, vitamin A, minerals and aminoacids.

## REVIEW LITERATURE

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## MATERIALS AND METHODOLOGY:-

### Materials:

- Cement tank
- Healthy Azolla culture
- Soil
- Fresh dung
- Net
- Ssp(single super phosphate)
- Carbocfuran

### Methodology:

1. To cultivate Azolla a concrete tank was used.
2. The size of tank depends upon the availability of raw material.
3. The collected biomass was placed under for about 10 days .
4. Azolla prefer shade and requires light (30-50% light required for its growth) for photosynthesis .
5. Azolla is a water based crop;one should ensure at least 5 inches of water in tank for proper growth.
6. Azolla grows well where the ideal temperature range is 20-35<sup>0</sup>c.
7. It requires a water PH value of 5 to 7 and relative humidity of 80-90%.

### Steps in Azolla cultivation:-

1. Size of the tank depends quantity of feed to be harvested. For small holders a pond of about 2m length and 1m width is sufficient .The ground is leveled and bricks are laid in required dimension.
2. Old plastic sacs or sheets are placed in the bottom of the pond

3. Then the pond is covered with 150 gauge durable plastic sheets
4. Secure sides of the plastic sheets by placing bricks over the sides walls
5. About 25kg of clean and fertile soil is spread uniformly across the pond
6. Then a mixture of 5kg cowdung and 30gm rajphos /musooriephos is applied uniformly
7. Water is maintained at a depth of 10cm in the pond
8. 500gm of Azolla culture is required per square meter of the pond
9. Azolla will fully cover the pond by 1-2 weeks and can start harvesting it

Maintenance of Azolla:-

- Apply 1kg cowdung and 10-20gm rajphos once in 2 weeks .
- Remove one fourth of water from the pond and refill it with fresh water once in 2 weeks
- Remove the soil and add 5kg fresh soil to the pond
  
- The pond should be emptied once in 6 months and cultivation of Azolla is restarted with fresh culture and soil

Care to be taken:-

1. Maintenance of the pure culture free from contamination is essential for good yield
2. Azolla should be harvested regularly to avoid overcrowding.
3. Temperature is an important factor for good growth .It should be around  $35^{\circ}\text{c}$  .The fodder plot is to be covered with a plastic sheet in cold regions so as to reduce the impact of cold weather.
4. Place with direct and adequate sunlight should be preferred .A shady place yields less.
5. The pH of the medium should be between 5.5 -7
6. Suitable nutrients such as cow dung slurry , micronutrients should be supplemented as and when required.

## RESULT and DISCUSSION:

1. After the 20 days, Azolla is harvested.
2. When this Azolla was applied to plants, it promoted the growth of stem and root.
3. The plant to which Azolla was applied was healthier than the other one.
4. It helps to increase the soil texture and overall soil quality.
5. When Azolla was applied to one plant of each species, then the growth in stem length was observed.
6. The observation is shown below in the table:

SL NO.	Name of the plants	Hight of plant
1	<i>Oryza sativa</i> (pot 1) With Azolla	120 cm.
2	<i>Oryza sativa</i> (pot 2) With Azolla	100 cm.
3	<i>Oryza sativa</i> (pot 3) Without Azolla	60 cm
4	<i>Oryza sativa</i> (pot 4) Without Azolla	65 cm.

On the basis of experiment, we concluded that Azolla increases the of the soil.

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