

SVSSC. Govt. Degree College (A), Sullurpet

Study Project Report-2025-26

On

“Impact of Environment Inside and Outside the Classroom on Germination Rates of Mung Bean, Rice, Coriander, Fenugreek and Mustard”



By

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Study project

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Period of Project : From August 2025 To September
2025

Name of the Project : *“Impact of Environment Inside and Outside
the Classroom on Germination Rates of
Mung Bean, Rice, Coriander, Fenugreek
and Mustard”*

Year : 2025-26

Student's Declaration

I, **CH. Munipoornia**, a student of II **BSc Botany Mojar** Program, Reg. No. **2413331003** of the Department of Botany, **SVSSC. Govt. Degree College (A), Sullurpet** do here by declare that I have completed the mandatory Student study peoject On *“Impact of Environment Inside and Outside the Classroom on Germination ates of Mung Bean, Rice, Coriander, Fenugreek and Mustard”* from **August 2025 to September 2025** at the Department of Botany under the Faculty Guideship of **Dr. P. Victoria Rani**, Lecturer, Department of Botany, SVSSC. Govt. Degree College (A), Sullurpet.

(Student Signature and Date)

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- ✧ I sincerely thank to **Staff** who are working in the college for giving valuable information and hands on experience in Study Project working time.

Student Signature

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1.Title of the Project

"Impact of invironment in side the class roomn Germination Rates of Mung Bean (*Vigna radiata*), Rice seeds (*Oryza sativa*), Coriander seeds (*Coriandrum sativum*), Trigonella seeds (*Trigonella foenum-graecum L*), Brasika seeds (*Brassica juncea*)

2. Project Work

The experiment was conducted by CH. Poornima, II B.Sc. (Botany Honours), IV Semester, to determine the effect of environmental factors such as temperature, humidity, and precipitation inside the classroom on the germination of Mung Bean (*Vigna radiata*), Rice (*Oryza sativa*), Coriander (*Coriandrum sativum*), Fenugreek (*Trigonella foenum-graecum* L.), and Mustard (*Brassica juncea*).

2.1. Objectives

- ◆ To study the effect of temperature on seed germination,
- ◆ To analyze the role of humidity in germination.
- ◆ To observe how water availability (precipitation simulation) affects germination.
- ◆ To compare germination rates among different seeds.

2.2. Introduction

Seeds are one of the most important parts of plants. They play a major role in agriculture, environment and human life. Seeds help in the production of plants. A single seed can grow into a new plant, continuing the life cycle. Seeds are the foundation of farming. Good quality seeds increase crop yield and support farmers income. Some varieties of Seeds are a major source of food.. They provide carbohydrates, proteins, vitamins and minerals. Many seeds produce oil (like mustard, sunflower). Some seeds are used in traditional and modern medicine. Seeds are used as fodder for animals. Many birds and animals depend on seeds for survival. Seeds help in plant growth, which helps Produces oxygen, Maintains ecological balance and Prevents soil erosion.

Vigna radiata

Mung Bean (*Vigna radiata*) belongs to the family Fabaceae. It is a small green seed plant that typically grows to a height of 30–90 cm. The leaves are trifoliate, meaning each leaf has three leaflets. The flowers are yellow in color, and the plant produces slender pods containing multiple seeds. Mung bean seeds germinate very quickly, usually within 2–3 days under suitable conditions. They require a moderate temperature range of 25–35°C, adequate moisture, and oxygen for proper respiration during germination. The plant thrives in a warm climate and needs a moderate amount of water (avoiding excess). Moderate to

high humidity supports healthy growth, and sunlight is essential after germination. Mung beans are highly nutritious, being rich in protein, fiber, and vitamins. They are widely used in Indian cuisine, especially in dishes like dal and sprouts. Additionally, the plant improves soil fertility through nitrogen fixation.



Oryza sativa

Rice (*Oryza sativa*) belongs to the family Poaceae (grass family). It is commonly known as rice or paddy when grown in fields. Rice is a monocot plant that typically grows to a height of 1–1.8 meters. Its leaves are long, narrow, and green, while the stem is hollow and jointed. The plant produces grains in clusters known as panicles. Rice seeds take about 3–7 days to germinate. Germination begins with the radicle (root) growing downward and the plumule (shoot) growing upward. Rice requires more water compared to many other crops and can grow in flooded or waterlogged conditions. It grows best at temperatures between 20–35°C, with high humidity supporting healthy growth. Sunlight is essential after sprouting. Rice is one of the most important staple foods in the world and serves as the main diet for a large population, especially in countries like India. It is rich in carbohydrates, making it a major source of energy. Rice is used in various forms such as cooked rice, rice flour, and in the preparation of snacks, sweets, and processed foods. Additionally, rice straw is used as animal feed. The plant has special adaptations that allow it to survive in low-oxygen conditions found in flooded soils, making it unique among many crops.



Coriandrum sativum

Coriander (*Coriandrum sativum*) belongs to the family Apiaceae. It is a small herbaceous plant that grows up to 30–60 cm in height. The leaves are soft, green, and deeply divided. The plant produces small flowers that are white or pink in color. The seeds are round, light brown, and aromatic. Coriander seeds take about 7–14 days to germinate, which is slower compared to many other seeds. Germination is often delayed due to the hard outer covering of the seeds. Better germination can be achieved by slightly crushing the seeds before sowing. The plant grows best at a temperature range of 20–30°C, with moderate watering and humidity. Sunlight is necessary after germination for healthy growth. Coriander is widely used as both a spice and a herb. Both the seeds and leaves are used in cooking. It is rich in vitamins, minerals, and antioxidants. The seeds are commonly used as a spice in curries, while the leaves are used for garnishing and adding flavor. It is also used in traditional medicine. Interestingly, each “seed” is actually a fruit that contains two seeds inside. Coriander is known for its distinct aroma and flavor.



Trigonella foenum

Fenugreek (*Trigonella foenum-graecum*) belongs to the family Fabaceae. It is a small herbaceous plant that grows up to 20–60 cm in height. The leaves are trifoliate, consisting of three small leaflets. The flowers are small and white to yellowish in color. The seeds are yellowish-brown, hard, and slightly bitter in taste. Fenugreek seeds germinate quickly, usually within 2–5 days, and show rapid root and shoot development. The plant is easy to grow under simple conditions. It requires a temperature range of 20–30°C, moderate watering, and moderate humidity. Sunlight is essential after sprouting for proper growth. Fenugreek is used both as a leafy vegetable and as a spice. It is rich in iron, protein, and fiber, and is widely used in traditional medicine. The leaves are commonly used in cooking, such as in methi curry, while the seeds are used as a spice. It is also valued for its health benefits, including aiding digestion and helping in diabetes control. Additionally, fenugreek helps improve soil fertility through nitrogen fixation. Due to its fast growth, it is ideal for experiments and educational purposes.



Brassica juncea

Mustard (*Brassica juncea*) belongs to the family Brassicaceae. It is a fast-growing herbaceous plant that typically reaches a height of 1–2 meters. The leaves are broad and green, and the plant produces bright yellow flowers. The seeds are small, round, and dark brown to black in color. Mustard seeds germinate very quickly, usually within 2–4 days, and show rapid early growth. This makes them suitable for short-term experiments. The plant grows best at temperatures between 15–30°C, with moderate watering and humidity. Adequate sunlight is required after germination for healthy development. Mustard is widely cultivated as a major oilseed crop. Its leaves are used as a vegetable, commonly known as mustard greens, while the seeds are used for extracting oil and as a spice.

Mustard oil is commonly used for cooking, and the seeds are used in seasoning. The leaves are also used in traditional dishes such as sarson ka saag.



Seed germination is an essential process in plant growth and is influenced by environmental factors such as temperature, humidity, and water availability. Different plant species respond differently to these conditions. This project aims to study how the environmental conditions inside and outside a classroom affect the germination of selected seeds grown in water without soil and with soil.

2.3. Methodology

This experiment was carried out in the Department of Botany at SVSSC Government Degree College (Autonomous), Sullurpet, during the academic year 2025–26, in the rainy season from August to September 2025.

Required Materials

- Seeds: Green gram (*Vigna radiata*),
- Rice (*Oryza sativa*),
- Coriander (*Coriandrum sativum*),
- Fenugreek (*Trigonella foenum-graecum*),
- Mustard (*Brassica juncea*),
- Petri dishes,
- Plastic trays,
- Water, Soil,
- Thermometer,
- Weighing balance (to measure 1 gram seeds)
- Hygrometer (for humidity),
- Measuring cylinder,
- Ruler or scale (to measure plant height)
- Notebook for observations

One gram of each selected seed was taken and placed in Petri dishes containing 20 ml of water. The Petri dishes were kept inside the classroom under normal environmental conditions. Growth parameters such as the number of days required for germination, plant height, and number of leaves were observed and recorded over a period of 10 days from the first day of the experiment.

One gram of each of the selected seeds was taken and sown in soil-filled plastic trays. The trays were placed outside the classroom under natural environmental conditions. Growth parameters such as the number of days required for seed germination, plant height, and number of leaves were observed and recorded over a period of 10 days from the first day of the experiment.

2.4. Results

During the experiment, different seeds showed variations in their germination patterns and growth. The environmental conditions recorded were humidity of 50–63%, temperature of 29–36°C, and precipitation around 10% inside the class room and outside of the classroom.

Munga beans (*Vigna radiata*): The seeds swelled quickly after soaking, and roots appeared within 5 days. The plants attained a long stem, height of about 9 cm, with a radicle length of approximately 6 cm after 10 days. Primary leaf and two pair of leaves were appeared. The growth was rapid, making it suitable for experiments and educational purposes. Where as outside of the college they showed grow well. The plants attained a stem height of about 10 cm, with Primary leaf and two pair of leaves were appeared by 10 days.

Rice (*Oryza sativa*): The seeds germinated within 4 days and showed rapid growth, attaining a stem length of about 10 cm with six green leaves in an erect position. However, after 10 days, the leaves turned pale in color inside the classroom. In contrast, rice plants grown outside the classroom showed healthy growth, reaching a similar stem length of about 10 cm with six green leaves, without any change in leaf color.

Coriander (*Coriandrum sativum*): The seeds absorbed water and became swollen. However, no germination was observed inside the classroom during the entire experimental period (10 days). In contrast, seeds placed outside the classroom showed good growth,

reaching a stem length of about 1.5 cm and producing a pair of leaves by the end of the experiment.

Fenugreek (*Trigonella foenum-graecum*): The seeds swelled quickly after soaking, and roots appeared within 5 days. The plants attained a stem height of about 2 cm, with a radicle length of approximately 4 cm after 10 days. Primary leaf and one pair of leaves were appeared. The growth was rapid, making it suitable for experiments and educational purposes. Where as outside of the college they showed grow well. The plants attained a stem height of about 9 cm, with a radicle length of approximately 5 cm after 10 days.

Mustard (*Brassica juncea*): The seeds germinated within 6 days. Thin white roots appeared after germination, but no significant growth was observed inside the classroom during the entire experimental period (10 days). In contrast, seeds placed outside the classroom showed good growth, attaining a stem length of about 8 cm and producing two leaves by the end of the experiment.

2.5. Table-1

S.No	Seed Name	Days of Germination	Growth Inside Classroom	Growth Outside Classroom	No. of Leaves (Outside)	Special Observation
1	Mung Bean (<i>Vigna radiata</i>)	5 days	Stem ~9 cm, radicle ~6 cm, moderate growth	Stem ~10 cm, healthy growth	Primary leaf + 2 pairs	Faster growth outside
2	Rice (<i>Oryza sativa</i>)	4 days	Stem ~10 cm, 6 leaves, leaves turned pale	Stem ~10 cm, 6 green leaves	6	Pale leaves due to low light indoors
3	Coriander (<i>Coriandrum sativum</i>)	Not observed (10 days)	No germination	Stem ~1.5 cm, good growth	2 (1 pair)	Slow germination, needs better conditions
4	Fenugreek (<i>Trigonella foenum-graecum</i>)	5 days	Stem ~2 cm, radicle ~4 cm, slow growth	Stem ~9 cm, radicle ~5 cm	Primary leaf + 1 pair	Much better growth outside
5	Mustard (<i>Brassica juncea</i>)	6 days	No significant growth	Stem ~8 cm, healthy growth	2	Needs sunlight for proper growth

2.6. Discussion of Results

The results of the present study clearly show that environmental conditions significantly influence seed germination and early plant growth. The recorded conditions (humidity 50–63%, temperature 29–36°C, and low precipitation ~10%) affected different seeds in different ways, both inside and outside the classroom.

Mung Bean (*Vigna radiata*) showed rapid germination and good growth under both conditions, but slightly better growth was observed outside the classroom. This agrees with standard studies which report that mung bean germinates quickly under warm temperatures (25–35°C) with adequate moisture and light. The slightly reduced growth inside the classroom may be due to limited sunlight and airflow.

Rice (*Oryza sativa*) germinated quickly and initially grew well in both conditions. However, the pale coloration of leaves inside the classroom indicates chlorosis, likely caused by insufficient light. According to plant physiology studies, rice requires good sunlight for chlorophyll formation and healthy growth, even though it can tolerate high moisture.

Coriander (*Coriandrum sativum*) did not germinate inside the classroom but showed growth outside. This is consistent with scientific observations that coriander seeds have a hard seed coat and require favorable external conditions such as proper aeration, light, and sometimes mechanical splitting for successful germination. The indoor conditions were likely not suitable for breaking dormancy.

Fenugreek (*Trigonella foenum-graecum*) showed germination in both conditions but exhibited much better growth outside. Literature suggests that fenugreek is a fast-growing plant under optimal light and moderate moisture. Reduced growth inside the classroom may again be due to limited light intensity.

Mustard (*Brassica juncea*) germinated but failed to grow significantly inside the classroom, while it grew well outside. This supports earlier studies indicating that mustard requires adequate sunlight and proper environmental exposure for healthy seedling development.

Overall, the experiment demonstrates that while some seeds can germinate under controlled indoor conditions within water, but excess water can prevent oxygen supply. Natural outdoor conditions (better sunlight, airflow, and environmental balance) promote healthier and faster plant growth. These findings align with general plant science principles, which state that light, temperature, water, and oxygen are critical factors influencing seed germination and seedling development.

2.7. Conclusion

The present study clearly demonstrates that environmental conditions play a crucial role in seed germination and early plant growth. Although some seeds were able to germinate inside the classroom, overall growth was comparatively better under natural outdoor conditions.

Seeds like mung bean (*Vigna radiata*) and fenugreek (*Trigonella foenum-graecum*) showed rapid germination in both environments, but their growth was more vigorous outside the classroom due to better sunlight and aeration. Rice (*Oryza sativa*) also germinated well indoors, however, the development of pale leaves indicated insufficient light, affecting chlorophyll formation. Coriander (*Coriandrum sativum*) failed to germinate indoors, suggesting that it requires more favorable external conditions for successful sprouting. Mustard (*Brassica juncea*) germinated but showed poor growth indoors, while it performed well outside.

From this study, it can be concluded that natural environmental conditions such as adequate sunlight, proper air circulation, and balanced moisture significantly enhance seed germination and healthy plant growth. Therefore, while indoor conditions may support germination to some extent, outdoor conditions are generally more suitable for optimal plant development.

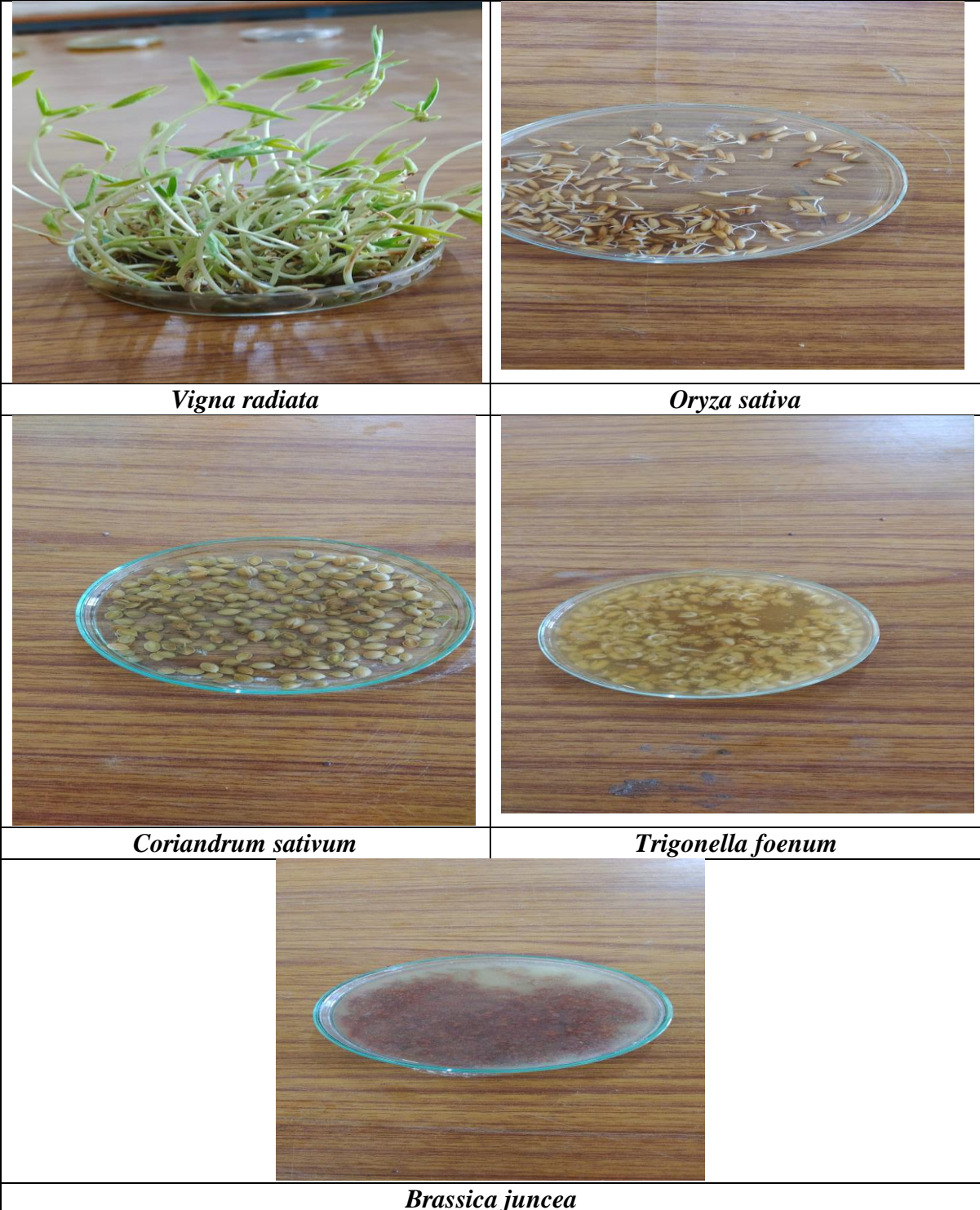
2.8. References

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2.9. Pictures

Inside the classroom-Planted in water





Students collection of soil for outside experment



Overall Project Result

