

Scientific Study on Indigenous Tribal Knowledge: Factors Affecting the Germination of Paddy

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ABSTRACT: Lush green forests, surrounded by gorgeous hills, waterfalls and lakes – all being punctuated with soothing, melodious sounds of colorful chirping birds. This isn't any fairytale land but Wayanad, the "Land of Paddy Fields". The traditional knowledge of Wayanad, especially of agriculture practices and conservation efforts, is very rich. Our Valat village is no exception. Agriculture is the backbone of the economy of Valat and the elders of the tribal community maintain a treasure of unwritten traditional agricultural knowledge, which is never subjected for any serious scientific studies.

Keywords: Gas layer chromatography; indole-3-acetic acid; phytochemical analysis; thin layer chromatography

INTRODUCTION

Lush green forests, surrounded by gorgeous hills, waterfalls and lakes – all being punctuated with soothing, melodious sounds of colorful chirping birds. This isn't any fairytale land but Wayanad, the "Land of Paddy Fields". Wayanad was once the land of paddy fields and was famous for hundreds of traditional and endemic rice varieties. Wayanad, the economically and educationally backward district has the highest number of tribal settlements in Kerala. And therefore, the traditional knowledge of Wayanad, especially of agriculture practices and conservation efforts, is very rich. Our Valad village is no exception. Agriculture is the backbone of the economy of Valad and the elders of the tribal community maintain a treasure of unwritten traditional agricultural knowledge, which is never subjected for any serious scientific studies. If we evolve a mechanism to unearth the underlying scientific principles of their knowledge and to propagate the same, we are sure that miracles can happen. This project is a humble effort with such an objective. We are sure that more and more in-depth studies are required to establish the findings of our miniature research. The seed of this project was sown in the Farmers' Day celebration of our School, when we had organized a programme to honour the traditional farmers of Valad, in which the interaction between the farmers and the future scientists of our school was the most attractive event. As the outcome of the fruitful discussions, the Farm Club, a subsidiary of the Science Club of our school had decided to cultivate 'Jeerakashala', the highly flavoured traditional rice variety of Wayanad, in four plots in the School premise. As a part of the Harvest Festival we had organized several programmes in which a discussion involving experts in agriculture sector and traditional farmers was a memorable one. The traditional farmers, while taking part in the discussion, tried to rumi-

nate their experiences in applying traditional knowledge for accelerating the rate of seed germination for the past several years. This was, in fact, a spark to initiate a scientific study in that line.

Objectives: The major objectives of the project were:

1. To study the different methods and different steps followed in germination of paddy seeds.
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3. To identify the different plants used in the different stages of germination of paddy seeds and their collection, preservation and planting.
4. To study the influence of different plants in germination process of paddy seeds
5. To identify the photochemicals and hormones in the leaves that influence seed germination of paddy seeds through experiments.

Hypothesis: traditionally some plant leaves are being used in the germination of rice seeds, such as **periyilum** (*clerodendrum infotunatum*), **neelakuvva** (*curcuma maeruginosa*), **manjal** (*curcumalonga*), **banana** (*musaparadisica*), **avanakk** (*ricinus communis*), and some phytochemicals in these plants help in the germination of rice seeds.

activities done

1. traditional information about the rice seed germination from the farmers where collected.
2. interacted with scientist and other experts
3. using traditional knowledge different plants such as **periyilum** (*clerodendrum infotunatum*), **neelakuvva** (*curcuma maeruginosa*), **manjal** (*curcumalonga*), **banana** (*musaparadisica*), and **avanakk** (*ricinus communis*) where used seed germination.
4. Thin Layer Chromatographic (TLC) technique was used to identify the phytochemicals in the leaves extract of selected plants.

5. Gas Chromatographic technique was used to identify the exact compound which promote germination.
6. Results of findings were shared with society.

MATERIALS AND METHODS

Materials:

Plants: Some wild varieties of plants

1. **Periyilum** (*Clerodendrum infotunatum*)
2. **Neelakuvva** (*Curcuma aeruginosa*)
3. **Manjal** (*Curcumalonga*)
4. **Banana** (*Musa paradisiaca*)
5. **Avanakk** (*Ricinus communis*),

Rice Seed: Aaryan (*Oryzasativa*)

Instruments, Chemicals and Apparatus: Following chemicals and apparatus have been used.

1. Leaf samples
2. Weighing balance
3. Mixie
4. Filter paper

Methods:

For this project we did interviews, field visits, Observations, Experiments, etc..

Interviews: We collect traditional knowledge from farmers about the conventional agricultural practices in paddy cultivation. We use unstructured interviews method for this. We approach Sri. Manual PJ and Sri. Rairu Mooppan for data collection.

Field visit: For the purpose of collection and validation of data from the practicing farmers we spend time to visit paddy fields in Valat locality. Sri. Manual PJ and Rairu Mooppan are farmers those doing traditional agricultural practices in paddy and we used to visit their fields.

Experiments:

1. Collection of paddy seeds: The paddy seeds processed by farmers, following traditional method (exposed to sunlight and mist for 14 days) were used for the study. In order to get seeds having uniform quality, the collected seeds were immersed in salt water (1kg sodium chloride in 10 L water) and the seeds got deposited at the bottom were collected for the study.

2. Collection of plants and processing of leaves for experiment: Five species of plants (Avanakk, Periyilam, Neelakuvva, Manjal and Banana) were collected from the neighboring areas of the school. The plant specimens were washed in clean water and the leaves isolated were chopped in small pieces. Chopped leaves were grounded with little water and made them in to juices. With the help of measuring jar take some amount of extract for the experiment.

3. Each sample was soaked by using following method:

- a.) Took clean and the pure water in six beakers.

5. Rotary shaker
6. Pencil
7. Beaker
8. Silica sheet
9. Capillary tube
10. Hexane
11. Ethanol
12. Plastic trays
13. Potato Dextrose agar media
14. Chromic acid
15. Tanic acid
16. Follins reagent
17. Copper sulphate
18. Sodium potassium tartarate
19. Acetone
20. Sodium hydroxide
21. Hexane
22. Filter paper

- b.) Essence of Periyilam leaf was added to one beaker containing water.
- c.) Essence of Manjal leaf was added to the second beaker containing water.
- d.) Essence of banana leaf was added to the third beaker containing water.
- e.) Essence of Neelakuvva leaf was added to the fourth beaker containing water.
- f.) Essence of Avanakk leaf was added to the fifth beaker containing water.
- g.) Sixth beaker containing water as control.
- h.) Process done

Activity 1: Equal quantities of seeds were taken using a 50ml measuring jar for the experiment.

Activity 2: The seeds were soaked for 15 hours and after that six samples were filtered and tied in cotton cloth and put weight on them.

Leaf extract mixed with lukewarm water was sprinkled on each pack of cotton.

Activity 3: After 39 Hrs the weight was removed, the pack was opened and the seeds transferred to different dishes that hold plant leaves. Leaf extract mixed with lukewarm water was sprinkled on each dishes. Weight was put on them. Soaking was repeated to avoid drying.

Activity 4: After 50 hrs the weight was removed and the germination rate of seeds was recorded. The 98% seeds which soaked in AVANAKK were germinated with strong and healthy shoots and 90% seeds which soaked in PERIYILAM were germinated with large shoots. The seeds were transplanted to specially prepared trays.

Activity 5: After 63 hrs the weight was removed and the germination rate of seeds was recorded. The 95% seeds which soaked in NEELAKKUVVA were germi-

nated with strong and long shoots. The 95 % seeds which soaked in MANJAL were germinated with short but strong shoots. The seeds were transplanted to specially prepared trays

Activity 6: After 75 hrs the weight was removed and the germination rate of seeds was recorded. The all other seeds were germinated with large shoots.. The seeds were transplanted to specially prepared trays.

RESULTS AND DISCUSSION

Quantitative analysis of different metabolites present in the various plants revealed that the metabolite present in *Ricinus communis* showed maximum quantity compared to the other plants. The result showed that the compounds like chlorophyll, amino acids, and protein enhance the synthesis of various hormones like Abscicic acid (ABA) and Indole 3 acetic acid (IAA). The experiment conducted on the five various plants remarkably inferred that the seed germination percentage was maximum on the *Ricinus communis* leaf extract. The result clearly informed that due to the

Activity 7: The Thin Layer Chromatographic technique was employed for phytochemicals analysis at MS Swaminadhan Research Foundation, Puthoor Vayal, Wayanad.

Gas Chromatographic technique was employed to find the amount of phytochemicals present in leaf extracts at Sir Seyyed College, Thalipparamb, Kannur.

abundance of the phytochemicals the seed germination in the rice has been promoted.

Indigenous knowledge of tribals in wayanad district on paddy cultivation is not revealed ever before through a scientific study. No evident research report is there on growth promotion of paddy by the plant *Ricinus communis*. In addition the growth promoting factor of the particular plant is also seems unexplained in the world of science. The study can interpret certainly pioneer one.

Table 1:

Sample Taken	After Filtering	Firmly Tied removing Weight	Shed to Tray	After One week
Seed + water	No visible change	No Visible change	Small shoots visible	Shoot increased length
Seed + Banana Leaf	No visible change	Shoot visible	Small shoot visible	Shoot increased length
Seed + Periyilam	No visible change	Shoot visible on 50% of seeds	Long shoot formed in all seeds	Shoot further increased length
Seed + Manjal	No visible change	Shoot visible on 33% of seeds	Weak and small shoots in all seeds	Shoots were found weak
Seed + Neelakuvva	No visible change	Small shoots visible on all seeds	Weak and small shoots found in all seeds	Shoot were found weak
Seed + Avanakk	No visible change	Longer shoots visible in all seeds	Strong, healthy and long shoots found in all seeds	Strong, healthy and long shoots found in all seeds

CONCLUSIONS

Avanakk, Neelakuvva, Manjal, Periyilam were found to accelerate seed germination. In Avanakk all seeds grown within 50 Hrs and the shoots are seemed to lengthy and more powerful. The shoots become weak within 50

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