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CLASS

GRADE 4

PROJECT TITLE

**COMPARATIVE STUDY OF
REUSED PAPER PRODUCTS
INTO PLANTABLE SEED
PAPER**

TITLE OF THE PROJECT

Comparative Study of Reused Paper Products into Plantable Seed Paper

INTRODUCTION

This research focuses on the innovative concept of converting waste and reused paper into plantable seed paper. Plantable paper is a biodegradable, eco-friendly material that has seeds embedded inside. After its use, instead of being thrown away, this paper can be planted in the soil, where it will germinate and grow into plants. The study compares different types of reused paper (such as newspaper, notebook paper, colored paper, and cardboard) to determine which one produces the best quality seed paper for germination.

Paper waste has become a serious environmental concern in modern society. Every year, millions of tons of paper are discarded after single use. The production of fresh paper requires cutting down trees, which increases deforestation and contributes to climate change. Recycling and reusing paper not only reduce deforestation but also minimize landfill waste and pollution. By creating seed paper, we add extra value to recycled paper since it contributes to a greener environment.

SELECTION OF PROBLEM AND BACKGROUND INFORMATION

Paper waste is one of the largest contributors to global waste pollution. Most paper products are used once and discarded, ending up in landfills. While large-scale recycling facilities exist, they require heavy industrial processing, machinery, and energy. On the other hand, small-scale methods, such as turning paper into seed paper, can be done at homes, schools, or community projects with minimal resources.

The central problem lies in people's tendency to throw away paper instead of reusing it. This project highlights that if paper is reused to make seed paper, it not only reduces waste but also contributes to greening the environment by giving back to nature.

OBJECTIVES

- **To study different reused paper types and their suitability for making seed paper**

This objective aims to examine how different types of waste paper, such as newspaper, notebook paper, colored paper, and cardboard, behave when turned into seed paper. Each type of paper has a unique thickness, texture, and ink content, which can influence how well the paper absorbs water and supports seed growth. By testing each paper type, the project identifies which materials are most eco-friendly and practical for making seed paper.

- **To test which type of reused paper helps the best germination of seeds**

The germination of seeds is the most important measure of success for plantable seed paper. This objective focuses on comparing the rate and percentage of germination across different paper types. For example, thinner papers may allow moisture and air to reach the seeds easily, leading to faster sprouting, while thicker papers may slow down the process. The findings will help in selecting the best paper for producing effective seed paper.

- **To promote eco-friendly alternatives to regular paper**

Another important goal of the project is to create awareness about using environmentally friendly materials instead of traditional paper products. Plantable seed paper serves a dual purpose—first, it reduces waste by reusing discarded paper, and second, it gives life back to nature in the form of plants. Promoting seed paper encourages sustainable choices in schools, homes, and even industries like packaging and greeting card production.

- **To encourage sustainable practices among students and society**

This project goes beyond science and connects directly to everyday life. By teaching students how to make and use seed paper, it inspires them to adopt habits of reducing, reusing, and recycling. When children, families, and communities participate in such activities, they become more aware of their role in protecting the environment. The ultimate objective is to instill a sense of responsibility toward nature and promote a greener, healthier society.

ABSTRACT

This project focuses on the innovative use of recycled paper to create plantable seed paper, an eco-friendly alternative that reduces waste while promoting greenery. Plantable paper is made by embedding seeds into sheets of reused paper pulp. Instead of being discarded after use, the paper can be planted in soil, where the seeds germinate and grow into plants. The study compares four different types of reused paper—newspaper, notebook paper, colored paper, and cardboard—to determine which produces the most effective seed paper for germination.

The experiment involved preparing pulp from each paper type, mixing in seeds such as mustard, coriander, and fenugreek, and forming sheets of seed paper. The seed papers were then tested for germination rates and growth. Observations revealed that notebook paper provided the best results, showing quicker and higher germination, followed closely by newspaper. Colored paper showed slower growth due to ink chemicals, while cardboard proved less effective because of its thickness and rigidity.

The findings highlight the potential of seed paper as a sustainable solution to both waste management and reforestation. This project demonstrates how simple recycling practices can inspire environmental responsibility and encourages the adoption of plantable seed paper in schools, homes, and industries.

MATERIALS AND METHODOLOGY

The methodology of this project was designed to test how different types of reused paper affect seed paper quality and germination. The following materials were required:

- Old newspapers
- Used notebook paper
- Colored waste paper
- Small cardboard pieces
- Seeds (mustard, fenugreek, or coriander)
- Water
- Mixer grinder/blender
- Sieve or mesh screen
- Tray and towels
- Rolling pin or flat board

Procedure:

1. Collect and tear different types of waste paper into small pieces.
2. Soak the paper pieces in water overnight to soften them.
3. Blend the soaked paper into a pulp using a mixer.
4. Mix seeds into the pulp carefully, avoiding overcrowding.

5. Spread the pulp evenly on a sieve/mesh and press it flat using a rolling pin or board.
6. Let it dry in sunlight until it becomes thin sheets of seed paper.
7. Cut into small pieces for testing.
8. Plant pieces of each type of seed paper in pots with soil.
9. Water daily and record the germination time and number of sprouts.

This systematic approach ensures fairness and accuracy in comparing results across different types of paper.



Variables

Independent variables

1. **Type of paper** — categorical: newspaper, notebook paper, colored paper, cardboard.
2. **Type of seed** — categorical: mustard, coriander, fenugreek
3. **Paper pulp thickness** — continuous/ordinal: measured as grams per sheet or by pulp volume (thin, medium, thick).
4. **Seed density (no. of seeds per piece)** — numeric: e.g., 10 seeds per test piece.

Dependent variables

1. **Germination rate (% germination)** — numeric: percentage of seeds that sprout within a fixed period (e.g., 14 days).
Time to first sprout — numeric: days from planting until the first visible sprout appears for each sample.
2. **Average seedling vigor / growth** — numeric: average seedling height (cm) after a set period (e.g., 14 days) or qualitative vigor score (weak, moderate, strong).
Physical strength of seed paper — numeric/qualitative: tensile strength or a pass/fail on handling (how easily the paper breaks apart when wet).
3. **Decomposition time** — numeric: days taken for the paper piece to break down in soil (optional long-term measure).

RISK FACTORS

1. **Handling of Mixer/Blender** – There is a risk of cuts from sharp blades, electric shock, or spills when blending the paper pulp.
2. **Use of Sharp Tools** – Scissors or cutters may cause cuts or minor injuries while shaping paper sheets.
3. **Seed Overcrowding** – Adding too many seeds into the pulp can reduce germination success and waste seeds.
4. **Toxic or Glossy Paper** – Glossy or chemically coated paper may release toxins that harm both seeds and soil.
5. **Drying in Sunlight** – Excessive heat may damage seeds, while leaving sheets overnight may cause fungal growth due to dew.
6. **Soil and Water Handling** – Messy work areas may cause slipping hazards, and wet soil can expose students to bacteria.
7. **Allergies** – It may be allergic to seed dust, paper fibers, or soil particles.

Safety Measures

1. **Adult Supervision** – Always operate the mixer or blender under adult guidance. Never touch the blades and ensure the lid is tightly closed before use.
2. **Safe Use of Tools** – Use child-safe scissors and work on a stable surface. Ask an adult for help when cutting thick paper.
3. **Control Seed Quantity** – Embed a fixed number of seeds per sheet (e.g., 10 seeds) to avoid overcrowding.
4. **Use Safe Paper** – Select plain or lightly printed recycled papers. Avoid glossy, laminated, or chemically coated sheets.
5. **Proper Drying** – Dry seed paper in moderate sunlight or shade and collect it before evening dew to prevent fungal growth.
6. **Clean Handling of Soil and Water** – Wash hands after handling soil, water carefully to avoid spills, and keep the working area dry.
7. **Allergy Precaution** – Wear a mask if dust is present, avoid seeds that may trigger allergies, and immediately inform a teacher if discomfort occurs.



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