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# Review of High Impact Plastics

**Rohit Bhargav**

**Himalaya Garhwal University, Uttarakhand**

**DOI: https://doi.org/10.5281/zenodo.14054256**

**Abstract:**

High impact plastics are a category of polymers engineered to endure significant stress and impact without fracturing. These materials are crucial in various applications across industries ranging from automotive to consumer goods. This paper reviews the characteristics, processing methods, applications, advantages, and challenges associated with high impact plastics. An emphasis is placed on the evolution of these materials, with a look at future trends and innovations.

## 1. Introduction:

Plastic materials have revolutionized modern manufacturing due to their versatility, lightweight nature, and cost-effectiveness. High impact plastics, in particular, exhibit superior mechanical properties, making them suitable for situations where resilience is paramount. Understanding the characteristics and applications of these materials is essential for engineers, manufacturers, and consumers alike.

## 2. Characteristics of High Impact Plastics:

High impact plastics are defined by their considerable toughness, which allows them to absorb energy during impact. Key characteristics include:

- **Impact Resistance**: High impact plastics are designed to withstand sudden force and shock, minimizing the risk of failure.

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- **Chemical Resistance**: Many high impact plastics resist various chemicals, making them suitable for industrial applications.
- **Thermal Stability**: These materials often exhibit good thermal properties, allowing them to function in a range of temperatures.
- **Dimensional Stability**: They maintain their shape under varying environmental conditions.

Typically, high impact plastics include copolymers such as Acrylonitrile Butadiene Styrene (ABS) and blends of high-density polyethylene (HDPE) and polystyrene (PS).

**3. Processing Methods:**

The manufacturing of high impact plastics involves several processing methods, each contributing to distinct properties of the final product:

- **Injection Molding**: This is the most common method for producing complex shapes and is often used to manufacture consumer goods, housing components, and toys.
- **Blow Molding**: Ideal for creating hollow parts, this method is frequently employed in packaging applications.
- **Extrusion**: Used for creating continuous shapes like sheets, films, and pipes.
- **3D Printing**: Emerging as a significant method for producing prototypes and custom components in a wide variety of sectors.

**4. Applications of High Impact Plastics:**

High impact plastics find application in diverse fields:

- **Automotive**: Used in dashboards, bumpers, and interior fittings due to their lightweight and durability.
- **Electronics**: Employed in the casings and housings of various devices to protect components from physical impacts.

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- **Consumer Products**: Items like luggage, sports equipment, and toys rely on their resilient properties.
- **Industrial Applications**: Used in pipelines, containers, and other manufacturing equipment due to their chemical resistance.

**5. Advantages and Challenges:**

**Advantages**

1. **Weight Reduction**: High impact plastics are typically lighter than metals, contributing to fuel efficiency in vehicles and ease of handling in consumer products.
2. **Cost-Effectiveness**: The manufacturing processes involved are often more economical than those for metalworking.
3. **Design Flexibility**: High impact plastics can be molded into complex shapes, allowing for innovative product designs.

**Challenges**

1. **Environmental Concerns**: The use of fossil fuels in plastic production and challenges related to waste management pose significant ecological issues.
2. **Lifecycle and Degradation**: Some high impact plastics are not biodegradable, leading to long-term environmental effects.
3. **Mechanical Limitations**: While they excel in impact resistance, some high impact plastics may not match the mechanical strength of metals for certain applications.

**6. Future Trends and Innovations:**

The future of high impact plastics is shaped by several emerging trends:

- **Biodegradable High Impact Plastics**: Research is underway to develop environmentally friendly alternatives that maintain impact resistance.

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- **Recycling Initiatives**: Advances in recycling technologies aim to repurpose high impact plastics, reducing waste and resource consumption.
- **Smart Plastics**: Incorporating sensors and electronics into high impact plastics opens avenues for innovations in various applications, such as real-time monitoring of product performance.

**7. Conclusion:**

High impact plastics serve crucial roles in modern manufacturing and product design, thanks to their unique combination of toughness, lightweight nature, and cost-effectiveness. While challenges related to environmental impact and material limitations exist, ongoing research and innovations show promise in enhancing these materials' sustainability and functionalities. Understanding these dynamics is vital for navigating the future of materials engineering and manufacturing.

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# School Education Policy: Framework, Challenges, and Future Directions

**Akshy Madloi**

**Govt.PG. College, Barwani M.P**

**DOI: https://doi.org/10.5281/zenodo.14054318**

**Abstract:**

School education policy is a significant aspect of national development, influencing both individual and societal outcomes. This paper examines the core components of effective school education policies, highlights challenges faced in implementation, and proposes future directions for enhancing educational outcomes.

## 1. Introduction:

Education is one of the fundamental human rights and a critical driver of economic development and societal progress. The school education policy dictates the framework within which education systems operate, governing curriculum design, teacher training, student assessment, equity of access, and resource allocation. Effective school education policies are essential for promoting quality education and ensuring that all students have the opportunity to succeed, irrespective of their background.

### 1.1 Components of Effective School Education Policy:

#### 1. Curriculum Development

Curriculum design is foundational to school education policy. A well-structured curriculum should be comprehensive, inclusive, and adaptable. It should reflect the needs of the learners and the society, incorporating critical life skills, digital literacy, and global citizenship.

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**2. Teacher Training and Professional Development**

Teachers are the backbone of the education system. Policies must prioritize the continuous professional development of educators. This involves initial training, ongoing mentorship, and access to resources that allow teachers to stay current with pedagogical trends and technological advancements.

**3. Assessment and Accountability**

A robust assessment framework is crucial for measuring educational outcomes. Standardized testing, formative assessments, and alternative evaluation methods contribute to understanding student progress. Policies should also establish clear accountability measures for schools, teachers, and administrators to ensure that objectives are met.

**4. Equity and Inclusion**

An effective education policy addresses disparities in access and outcomes. This includes strategies to support underprivileged students, promote inclusive education for students with disabilities, and ensure gender equality in education. Effective policies must actively work to eliminate systemic barriers.

**5. Resource Allocation**

Funding is a critical aspect of education policy. Adequate funding is necessary for infrastructural development, teaching materials, and ensuring that students have access to a conducive learning environment. Policymakers must prioritize equitable funding models that direct resources to the most underserved areas.

**6. Community and Parental Engagement**

Engaging parents and communities fosters a supportive educational environment. Policies should encourage parental involvement in school activities, creating partnerships that can enhance student learning experiences. Community engagement also helps to align school initiatives with local needs and values.

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**Challenges in Implementing School Education Policy**

While each component of school education policy is vital, several challenges hinder effective implementation.

**1. Funding Constraints**

Limited budgets often result in inadequate resources for schools. Economic constraints can lead to teacher shortages, insufficient facilities, and limited access to learning materials.

**2. Bureaucratic Inertia**

Rigid bureaucratic structures can impede timely decision-making and responsiveness to emergent educational needs. Policymaking often becomes bogged down in processes that fail to address the dynamic nature of education.

**3. Ineffective Stakeholder Collaboration**

Collaboration among government bodies, educational institutions, private sector stakeholders, and community organizations is often lacking. Misalignment of goals can lead to fragmented initiatives that fail to produce comprehensive educational reforms.

**4. Resistance to Change**

Resistance from educators, administrators, and communities can stymie the implementation of new policies or revised curricula. Stakeholders may be apprehensive about changes, particularly if they perceive them as threatening to established practices.

**5. Global Challenges**

Issues such as climate change, migration, and technological disruption present new demands on education systems. Policies must adapt to prepare students for a rapidly changing global landscape.

**Future Directions for School Education Policy**

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**1. Emphasis on Digital Learning**

As technology increasingly permeates daily life, educational policies must incorporate digital literacy and learning. Hybrid models of instruction that blend in-person and online learning can enhance education accessibility and flexibility.

**2. Focus on Mental Health and Well-Being**

Recognizing the importance of mental health in educational success, future policies should include mental health resources and programs that promote the overall well-being of students.

**3. Lifelong Learning Frameworks**

The dynamic nature of current job markets necessitates a shift toward lifelong learning. Education policies should support continuous learning and skill development beyond traditional schooling years.

**4. Data-Driven Decision Making**

Utilizing data analytics can inform policy decisions, enabling a more responsive and adaptive education system. Policymakers should cultivate a culture of data collection and analysis to monitor progress and effectiveness.

**5. Global Collaboration**

International partnerships can enhance educational practices and resource sharing. Policies should promote collaboration across borders to address common educational challenges and share successful strategies.

## 2. Conclusion:

School education policy is a multifaceted domain that requires careful consideration of diverse components to foster effective systems. Although significant challenges remain, innovative approaches, stakeholder engagement, and a commitment to equity can propel education

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systems toward a brighter future. Policymakers must heed the changing landscape of global education and adapt their strategies accordingly, ensuring that all students are equipped with the knowledge and skills to thrive in an increasingly interconnected world.

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# The Global Market Value of Lal Chandan (Sandalwood)

**Gorav Joshi**

**Dr. A. P. J. Abdul Kalam University Indore M.P.**

**DOI: https://doi.org/10.5281/zenodo.14054424**

## Abstract:

Lal Chandan, commonly known as red sandalwood, has been prized for centuries for its unique fragrance, medicinal properties, and cultural significance. This paper aims to analyze the global market value of Lal Chandan, exploring its applications in various sectors, market trends, demand-supply dynamics, and challenges. With increasing awareness of its benefits and growing demand in cosmetics, pharmaceuticals, and traditional medicine, the market for Lal Chandan continues to evolve. This paper provides insights into the market landscape, pricing trends, and the future potential of this valuable resource.

## 1. Introduction:

Lal Chandan (Pterocarpus santalinus) is a type of sandalwood native to India, particularly found in the southern states. Unlike the more commonly known white sandalwood (Santalum album), which has faced significant overexploitation, Lal Chandan has gained attention for its deep red color, therapeutic properties, and rich aroma. Traditionally, it is used in religious ceremonies, traditional medicine, skincare products, and for ornamental purposes.

The increasing global demand for natural and sustainably sourced products has significantly contributed to the rise in the market value of Lal Chandan. However, the trade of this species is under scrutiny due to environmental concerns and regulations aimed at preventing illegal harvesting.

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## Historical Context

### Traditional Uses

Historically, Lal Chandan has been used in various cultural and religious practices in India. Its wood has been carved into various figurines, and its essential oil has been utilized in perfumes and incense. Recognized for its cooling properties, Lal Chandan is also employed in traditional Ayurvedic medicine.

### Economic Importance

In recent decades, the economic value of Lal Chandan has increased significantly, attracting attention from various market sectors. The establishment of laws and regulations concerning the sustainable harvesting of sandalwood adds complexity to its market dynamics.

## Market Dynamics

### Demand and Supply

The demand for Lal Chandan is driven primarily by the cosmetics, pharmaceutical, and aromatherapy industries. Factors contributing to the increased demand include:

1. **Rising Awareness**: A growing awareness of herbal and natural products among consumers has led to increased interest in Lal Chandan.
2. **Cultural Significance**: In many cultures, Lal Chandan is integral to rituals and is perceived as a symbol of purity and spirituality.
3. **Medicinal Uses**: The use of Lal Chandan in Ayurvedic practices boosts its demand, especially in regions where traditional medicine thrives.

**Supply Constraints**: The supply of Lal Chandan is limited due to several factors:

1. **Deforestation and Habitat Loss**: Unsustainable harvesting practices and deforestation have reduced the availability of natural resources.

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2. **Regulatory Measures**: In response to unsustainable practices, governments and international organizations have implemented regulations, which can restrict supply.
3. **Slow Growth Rate**: Lal Chandan trees have a long growth cycle, taking several years to mature, which means that replenishing supply to meet demand can be challenging.

### Global Market Trends

The global market for Lal Chandan is experiencing a noticeable rise, driven by:

1. **Market Growth**: The global essential oils market is projected to grow significantly, with Lal Chandan essential oil being a sought-after product.
2. **Luxury and Niche Markets**: High-end cosmetics brands and luxury goods manufacturers are increasingly incorporating Lal Chandan into their products, further boosting its market value.
3. **Sustainable Practices**: There's an increasing trend toward sustainability, with brands and consumers prioritizing ethically sourced materials, which can add to the perceived value of Lal Chandan.

## Market Valuation

### Current Market Value

As of 2023, the market value of Lal Chandan has seen substantial growth, with estimates suggesting a market size of several hundred million USD globally. The price per kilogram can vary widely, depending on factors such as quality, sourcing practices, and market demand, with premium products fetching significantly higher prices.

### Price Trends

Over the past few years, Lal Chandan prices have fluctuated due to changes in supply dynamics and global demand. Factors affecting pricing include:

- **Quality**: Higher quality wood and oils command better prices.

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- **Sustainability certifications**: Products that are certified as sustainably sourced tend to have higher market valuation.
- **Market Speculation**: Due to its limited availability, speculative trading can influence prices, leading to volatility.

### Challenges in the Market

Despite the growing demand, the Lal Chandan market faces several challenges:

1. **Regulatory Challenges**: Stringent regulations can lead to difficulties in sourcing and selling. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) has placed restrictions on the trade of certain sandalwood species.
2. **Environmental Concerns**: Unsustainable harvesting and deforestation contribute to the decline of Lal Chandan populations, leading to increased scrutiny from environmentalists and regulators.
3. **Economic Pressures**: Fluctuating economic conditions, including the impact of global economic downturns, can affect market demand and supply dynamics.

### Future Outlook

The future of the Lal Chandan market is promising, given the rising global demand for natural and sustainably sourced products. As consumers continue to lean towards herbal and organic options, the value of Lal Chandan may rise. Moreover, innovations in sustainable cultivation and harvesting practices could enhance supply while preserving this valuable resource.

The potential collaboration between government bodies, NGOs, and the private sector to promote sustainable practices is crucial for the longevity of the Lal Chandan market. There is an increasing call for transparency in sourcing and fair trade practices, which can significantly enhance market integrity and value.

## 2. Conclusion:

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Lal Chandan holds significant global market value, driven by its diverse applications and cultural significance. However, the market is fraught with challenges, including regulatory scrutiny and environmental concerns. As demand continues to grow and sustainable practices gain traction, the market for Lal Chandan is expected to flourish, assuming stakeholders invest in sustainable sourcing and practices. Given the evolving consumer preferences towards natural products, Lal Chandan is poised to continue its legacy as a valuable resource in the global market.

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# Best Teaching Practices for Physics

**Akshy Madloi**

**Govt.PG. College, Barwani M.P**

**DOI: https://doi.org/10.5281/zenodo.14054454**

**Abstract:**

Teaching physics effectively requires a diverse range of strategies to engage students and promote a deep understanding of fundamental concepts. This paper presents best practices for teaching physics, focusing on student-centered learning, hands-on activities, the integration of technology, the importance of real-world applications, and the cultivation of critical thinking skills. These practices aim to foster an environment where students are motivated to learn and capable of applying their knowledge in varied contexts.

## 1. Introduction:

Physics, often described as the fundamental science, underpins our understanding of the natural world. Teaching physics effectively is crucial for cultivating the next generation of scientists, engineers, and informed citizens. However, traditional methods of instruction that focus solely on rote memorization and theoretical understanding have often proven inadequate. Instead, educators are increasingly recognizing the importance of active and engaging teaching methodologies. This paper explores best practices that can enhance the teaching and learning of physics, focusing on approaches that promote engagement, understanding, and application.

## 1. Student-Centered Learning

Student-centered learning shifts the focus from the instructor to the learner. This approach emphasizes the importance of actively engaging students in the learning process.

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### 1.1 Inquiry-Based Learning

Inquiry-based learning encourages students to ask questions, conduct experiments, and engage in problem-solving. This method allows students to explore concepts in-depth and fosters a sense of curiosity and independence. For instance, using guided inquiry labs where students formulate their own hypotheses and design experiments can lead to deeper learning and retention of physics concepts.

### 1.2 Collaborative Learning

Collaborative learning promotes teamwork and allows students to learn from each other. Group activities, discussions, and peer teaching not only enhance understanding but also build communication skills. For example, employing think-pair-share techniques or problem-solving groups can facilitate deeper engagement with complex physics topics.

## 2. Hands-On Activities

Experiential learning through hands-on activities is crucial in physics education. Engaging students physically in experiments and demonstrations helps solidify abstract concepts.

### 2.1 Laboratory Experiments

Experiments provide students with direct experience of physical principles. Well-designed laboratory activities should encourage exploration and critical thinking. For example, engaging students in projects that require them to design experiments to test motion or energy conservation principles can make concepts more relatable.

### 2.2 Simulations and Demonstrations

Physics concepts such as forces and energy can be abstract. Using interactive simulations and demonstrations allows students to visualize and manipulate variables in real-time, leading to a more profound understanding. Tools like PhET Interactive Simulations provide platforms where students can explore concepts virtually, complementing hands-on experiences.

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### 3. Integration of Technology

Technology has transformed education, and its integration into physics teaching can facilitate deeper understanding and engagement.

#### 3.1 Interactive Software and Apps

Utilizing educational technology, such as simulation software and modeling tools, can enhance understanding. Programs that visualize concepts such as electromagnetic waves or quantum mechanics can help students grasp complex ideas. Interfaces that allow manipulation of variables can foster a sense of agency in learning.

#### 3.2 Online Resources and MOOCs

Access to online lectures, tutorials, and open educational resources expands the learning environment beyond the classroom. Massive Open Online Courses (MOOCs) and physics-specific platforms allow students to explore topics at their own pace, providing opportunities for individualized learning.

### 4. Real-World Applications

Connecting physics concepts to real-world applications enhances relevance and motivation for students.

#### 4.1 Contextual Learning

Incorporating real-life examples and case studies helps students appreciate the relevance of physics. Investigating topics like renewable energy, medical imaging technologies, or the physics of sports can make abstract concepts tangible and compelling.

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### 4.2 Problem-Based Learning

Problem-based learning (PBL) places students in real-world scenarios where they must apply physics principles to devise solutions. This approach encourages critical thinking and reinforces the practical application of concepts they learn in class.

### 5. Critical Thinking and Problem Solving

Encouraging critical thinking and problem-solving skills is essential for physics education.

### 5.1 Encouraging Questions and Exploration

Creating an environment where questions are welcomed fosters curiosity. Teachers should encourage students to ask why and how, leading to a culture of exploration and inquiry.

### 5.2 Effective Assessment

Formative assessments, such as peer assessments, self-reflections, and concept maps, provide valuable feedback. Assessments should focus on understanding and application rather than rote memorization. Emphasizing conceptual understanding over procedural knowledge can better prepare students for real-world applications.

## 2. Conclusion:

Effective teaching practices in physics go beyond traditional memorization and recall. By adopting student-centered learning, integrating hands-on activities, leveraging technology, connecting to real-world applications, and fostering critical thinking, educators can create a more engaging and effective learning environment. As physics continues to evolve, it is essential for educators to adapt and incorporate these best practices to prepare students for the challenges of the future.

## 3. References:

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# Health Risks Associated with Antibiotic Use

**Piyus Joshi**

**DAVV Indore, M.P**

**DOI: https://doi.org/10.5281/zenodo.14054863**

**Abstract:**

Antibiotics have revolutionized modern medicine, providing effective treatment against bacterial infections and significantly reducing morbidity and mortality rates. However, their widespread and often inappropriate use has raised significant health concerns. This paper examines the health risks associated with antibiotic use, including antibiotic resistance, adverse drug reactions, disruptions to the microbiome, and long-term health consequences. The aim is to highlight the importance of responsible antibiotic use, the implementation of stewardship programs, and the necessity for ongoing research to mitigate these risks.

## 1. Introduction:

Antibiotics are a class of antimicrobial agents that target bacterial infections. Since the discovery of penicillin in the early 20th century, antibiotics have been a cornerstone of modern medicine, facilitating surgeries, cancer treatments, and improving overall public health. Despite their successes, the health risks associated with antibiotic use have become increasingly apparent. This paper reviews the primary health risks linked to antibiotics and discusses the implications for public health.

## 1. Antibiotic Resistance

### 1.1. Mechanisms of Resistance

Antibiotic resistance occurs when bacteria evolve mechanisms to resist the effects of drugs that once effectively eliminated them. This resistance can be acquired through genetic mutations or horizontal gene transfer, wherein resistant genes are transferred between bacteria. Factors

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contributing to the rise of antibiotic resistance include over-prescription, non-compliance with treatment regimens, and the use of antibiotics in agriculture.

### 1.2. Public Health Impact

The World Health Organization (WHO) classifies antibiotic resistance as one of the top ten global public health threats. Infections caused by multidrug-resistant organisms (MDROs) lead to longer hospital stays, higher medical costs, and increased mortality. The economic burden of antibiotic resistance in the United States alone is estimated to be around $20 billion annually due to added healthcare costs and lost productivity.

## 2. Adverse Drug Reactions

While antibiotics can effectively treat infections, they are not without side effects. Adverse drug reactions (ADRs) range from mild hypersensitivity reactions to severe, life-threatening conditions. Common side effects include gastrointestinal disturbances, such as nausea and diarrhea, and complications like Clostridioides difficile infections, which can cause severe colitis.

### 2.1. Allergic Reactions

Allergic reactions to antibiotics, such as penicillin, can result in skin rashes, anaphylaxis, and other serious complications. The prevalence of such reactions highlights the necessity for careful patient assessment and consideration of antibiotic alternatives when necessary.

### 2.2. Drug Interactions

Antibiotics can interact with other medications, leading to reduced efficacy or increased toxicity. For instance, antibiotics such as rifampin can significantly decrease the efficacy of anticoagulants, necessitating close monitoring of patient responses.

## 3. Microbiome Disruption

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### 3.1. The Role of the Microbiome

The human microbiome is a complex ecosystem of microorganisms that plays a crucial role in digestion, immune function, and overall health. Antibiotics can indiscriminately kill beneficial bacteria along with pathogenic ones, resulting in dysbiosis—a microbial imbalance that can lead to several health issues.

### 3.2. Long-term Health Consequences

Research indicates that alterations in the microbiome caused by antibiotic use may be linked to long-term health consequences, such as obesity, allergies, autoimmune diseases, and even mental health conditions. These connections underscore the need for a balanced approach to antibiotic prescribing, considering both immediate benefits and long-term implications.

## 4. The Need for Responsible Antibiotic Use

### 4.1. Antibiotic Stewardship

Antibiotic stewardship programs aim to enhance patient outcomes while minimizing unintended consequences associated with antibiotic use. These programs promote the optimal selection, dosage, and duration of antibiotic therapy to combat resistance and improve therapeutic effectiveness.

### 4.2. Public Awareness and Education

Increasing public awareness about the appropriate use of antibiotics is crucial. Educational campaigns should inform patients about the risks of misuse and the importance of adhering to prescribed regimens.

## 2. Conclusion:

While antibiotics remain vital for treating bacterial infections, their associated health risks necessitate a cautious and informed approach to their use. With rising antibiotic resistance,

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adverse drug reactions, and microbiome disruptions, it is imperative to adopt strategies that ensure the responsible use of these medications. Ongoing research, public awareness initiatives, and robust antibiotic stewardship programs are critical for safeguarding the efficacy of antibiotics and protecting public health.

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# Effect of Bio- compost on seed germination and growth of *Cucumis sativus*

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**Abstract:**

The present communication deals with Effect of Bio- compost on seed germination and growth of *Cucumis sativus* . The domestic bio compost was used as both extract and decoction at different dilutions to analyze its effect on seed germination, leaf emergence, growth and plant biomass. Effect of different concentrations of waste extract and decoction was compared to that of distilled water (control). The results revealed that all the concentrations of extract/decoction promoted seed germination, also contributed to seedling height, plant growth and biomass accumulation. However, an increase in dilution ratios from 1:5 to 1:8 had a significant effect on germination and growth of cucumber plants. This suggests that domestic waste, which is one of the major causes of environmental pollution, can be used as an alternative to synthetic plant growth nutrients.

**Keywords:** Bio-compost, Seed germination, *Cucumis sativus*

## 1. Introduction:

Waste generation and its subsequent accumulation by increase in human population is one of the major problems confronting future generations. Solid waste results from various sources including food, animal, hazardous, industrial, medical, mineral wastes, etc. Urban solid waste includes household garbage, construction and demolition debris, sanitation residues, trade, industrial refuse and biomedical solid waste (CPCB, 2000). India produces 300 to 400g of solid waste per person per day in town. At the same time the domestic waste can contain many

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reusable substances of high value, depending on there being an adequate technology to convert this residual matter into commercial products either as raw material for secondary processes as operating supplies or as ingredients of new products. Numerous valuable substances in food production are suitable for separation and recycling at the end of their life cycle, even though present separation and recycling processes are not absolutely cost efficient (Laufenberg et al., 2003).

Most of these wastes like agriculture wastes are biodegradable and can be converted into valuable resources that reduce their negative impacts. However, waste collected from homes may be recycled and used as a potential resource, which is the main objective of this study.

It is evident that the household waste discarded daily also has a potential source of carbon, nitrogen, vitamins and amino acids which generally induce plant growth. Therefore, the present work was undertaken to evaluate the effects of various domestic vegetable and fruit waste on the germination and growth of cucumber plants.

## 2. Material and Methods:

The domestic waste (peels) obtained from vegetables like potato (Solanum tuberosum L.), pomegranate (Punica granatum), outer leaves of cabbage (Brassica oleracea), root waste of coriander (Coriandrum sativum) were used to prepare extract and decoction samples. The vegetable and fruits used in the present study were selected based upon their (a) availability throughout the year; (b) source of plant growth promoting ingredients like: carbon, nitrogen, mineral and amino acids and (c) absence of toxic or harmful components. The collected vegetable and fruit waste was washed thoroughly with running tap water, distilled water, air dried for an hour to weigh them as follows-peels of potato peel (45 g), pomegranate (10g), cabbage leaves (25g) and roots of coriander (5 g), which were finely chopped and used to prepare decoction as well as crude extract samples.

The decoction was made by crushing the waste material using sterile mortar and pestle, followed by heating at 700C for 15 minutes, which was filtered through muslin cloth. The

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filtrate was centrifuged at 12000 rpm for 5 minutes to precipitate any unwanted particles. The supernatant was gently aspirated (up to 60ml) that was agitated using a shaker for 24hrs. This preparation was preserved at 4°C and used as a prospective medium for the seed germination studies. On the other hand the crude extract was prepared by grinding the waste material in a mixer grinder with 25ml distilled water. The mixture was filtered using a muslin cloth and the filtrate was incubated in a shaker for 24hrs. The extract obtained (about 70ml) was preserved at 40C for future use and to avoid any contamination The treatments designed from both decoction and crude extract fall in a range of dilution ratios from 1:1 (1 ml decoction/ extract + 1 ml distilled water) to 1:8 (1 ml decoction/ extract + 8 ml distilled water), respectively. The different dilutions ratios were used to assess their suitability and identify a best dilution that promotes significant seed germination and plant growth. The whole experiment was setup in a culture room with optimum conditions such as incubation temperature of 25±20C, a light intensity of 2000 lux at 12 h photoperiod and a relative humidity of 80 per cent throughout the experiment. The seeds of tomato were thoroughly washed in running tap water for 2hrs and surface sterilized with a 0.5-2 per cent (v/v) sodium hypochlorite solution. Further, they were finally rinsed thrice with sterile distilled water and introduced for an overnight incubation in the respective dilution against a control which was distilled water. Five tomato seeds were sown in Petri plates with evenly spread cotton and treated by their respective decoction and extract dilutions at subsequent time intervals. The assessments including rate of germination, appearance of leaf and shoot length were carried out after 144hrs (6 days) and 168 hrs (7 days). While the other parameters like root length, wet weight and dry weight were recorded after 7 days. The dry weight of seedlings was taken after keeping them in hot air oven at 800C for 24 hours.

## 3. Result and Discussion:

our results reveled that the present study on Cucumis sativus were analyzed and compared for determining different parameters including germination rate, leaf emergence, average length of whole plant, average fresh and dry weight of whole plant in response to decoction and crude extract. It was observed that the roots of cucumber inoculated in waste extract were thicker and

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stronger compared to control. The decoction treatment (ratio) from 1:1 to 1:4 showed 60 per cent germination and the dilution ratio from 1:5 to 1:8 showed 100 per cent germination along with the maximum plumule length of 10.5 cm, while the control showed only 40 per cent germination with no leaves appeared after 144hrs . Interestingly, leaves were emerged much earlier in all the treated plants in comparison to control . The observations recorded at 168 hrs showed a maximum increase in plumule length of 10.2 cm for 1:8 decoction treated plants. The effect of Bio compost on plant growth was consistent with the crude extract treatment.

**Table 1: Growth of cucumber at different dilutions of decoction media**

| Time period | Parameters | Control | Treatments (sample dilution) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1:1 | 1:2 | 1:3 | 1:4 | 1:5 | 1:6 | 1:7 | 1:8 |
| 144 hrs. | Number of seeds germinated | 2 | 3 | 3 | 3 | 4 | 5 | 5 | 5 | 5 |
| | Appearance of leaf | - | + | + | + | + | + | + | + | + |
| | Length of plumule (cm) | 1 | 2.2 | 2.5 | 2.7 | 2.8 | 3 | 3.1 | 3.3 | 3.5 |
| 168hrs | Number of seeds germinated | 3 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 |
| | Appearance of leaf | + | + | + | + | + | + | + | + | + |
| | Length of plumule (cm) | 1.5 | 3.3 | 3.5 | 3.6 | 3.6 | 3.7 | 3.8 | 4 | 4.2 |

**Note : - (+ presence of leaves) ( - absence of leaves)**

The crude extract supported 80- 100 per cent germination, early leaf emergence and a maximum plumule length of 10.8cm at 144hrs and 4.5 cm at 168 hrs . While the plants grown in distilled water (control) showed a plant length of only 4.3cm. When the cucumber plants were assessed for their total biomass content, by analyzing fresh and dry weights of shoots and roots, there was profound increase in the plants grown under treatment (both decoction and crude extract) compared to control . Peels of banana, pomegranate, sweet lime and orange are highly rich in potash, ion, zinc, etc. The powder of fruit peels extract was used as a natural fertilizer, along with fenugreek seeds to test the utilization of fruit peel powder as a natural growth enhancer (Mercy et a 2014). Results of current experiment showed that bio -compost has potential to promote and enhance plant growth. The use of domestic waste as plant growth

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promoter ingredient would be one of the beneficial strategies to reduce its accumulation and protect the environment.

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