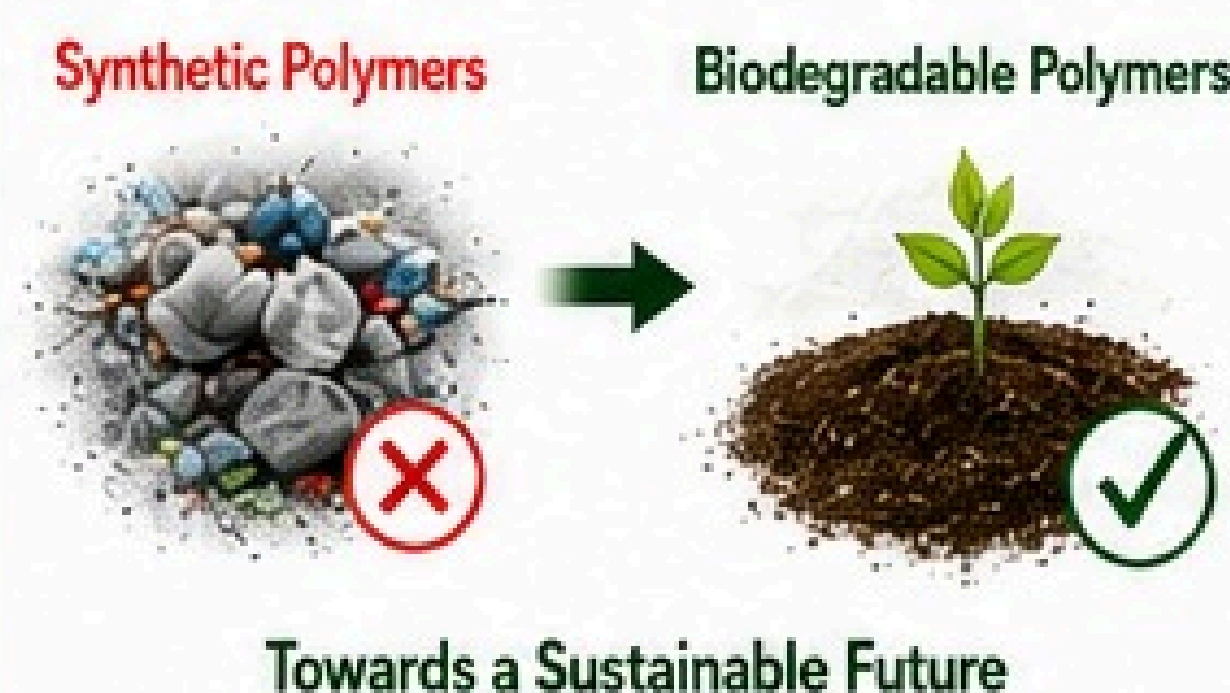


INTRODUCTION

- The extensive use of synthetic polymers in drug delivery systems poses serious environmental threats due to their non-biodegradable nature, leading to long-term pollution and ecological damage.
- Biodegradable polymers derived from natural sources offer a sustainable alternative that is biocompatible, eco-friendly, and effective for drug delivery.
- Paracetamol was selected as a model drug due to its wide use and well-known properties.
- Natural polymers such as chitosan and starch were chosen for their biodegradability, low toxicity, and minimal environmental impact.



AIM

To design and evaluate a biodegradable polymer-based drug delivery system using natural polymers (chitosan and starch) as a sustainable alternative to synthetic polymers.

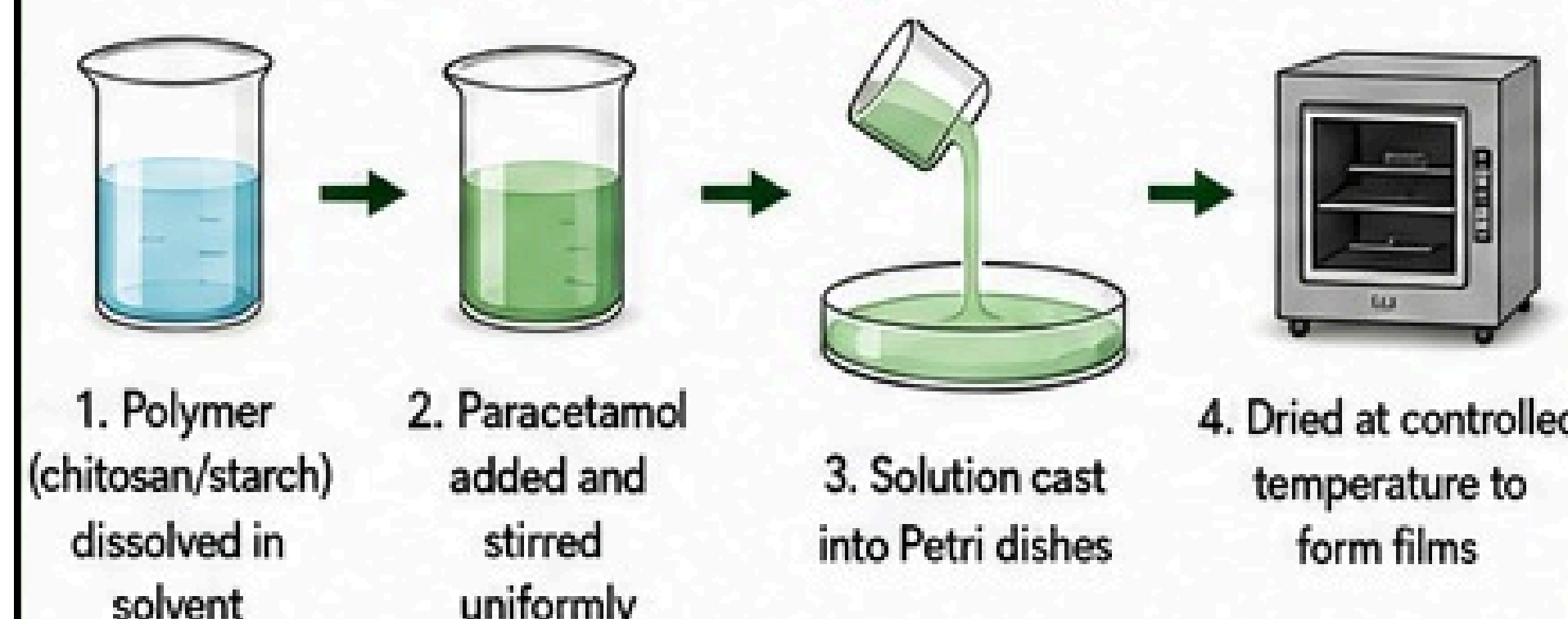
OBJECTIVES

- ✓ To prepare paracetamol-loaded films using biodegradable polymers.
- ✓ To evaluate drug content, in vitro drug release, biodegradation, and stability.
- ✓ To develop an eco-friendly drug delivery system with minimal environmental impact.

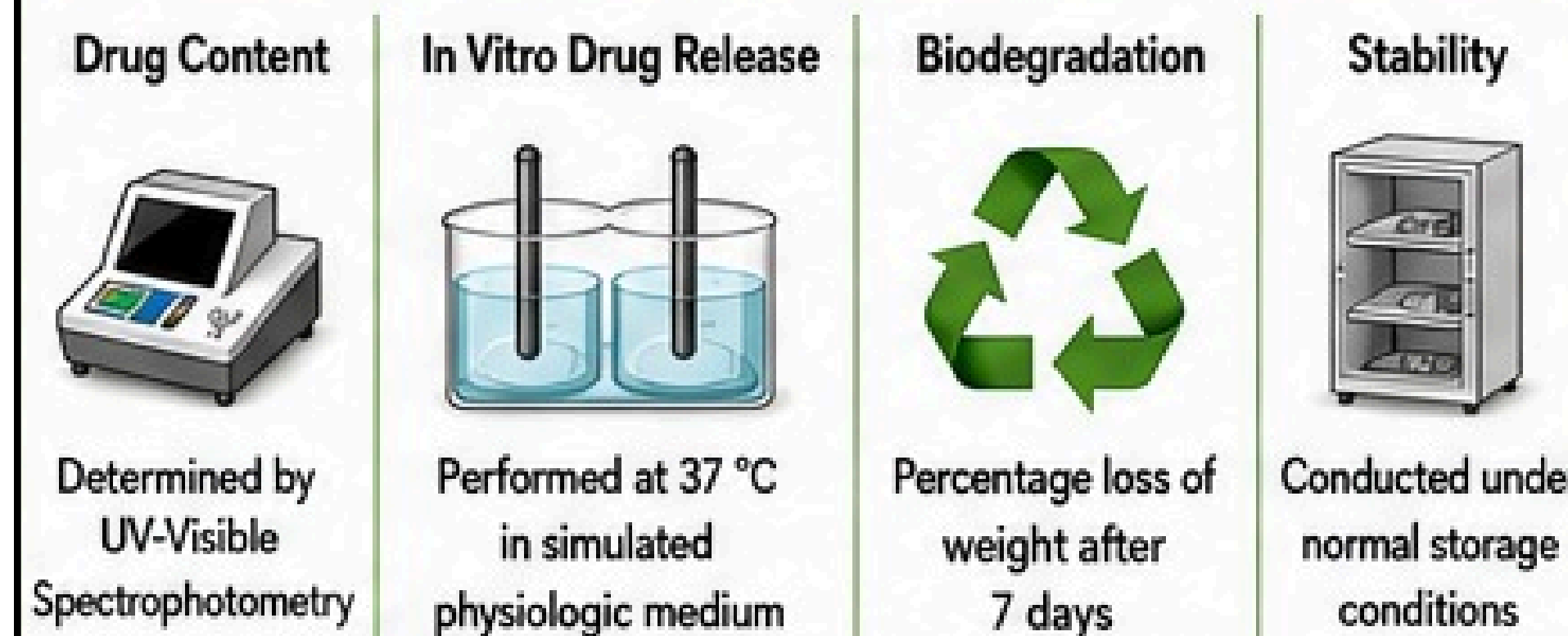


METHOD

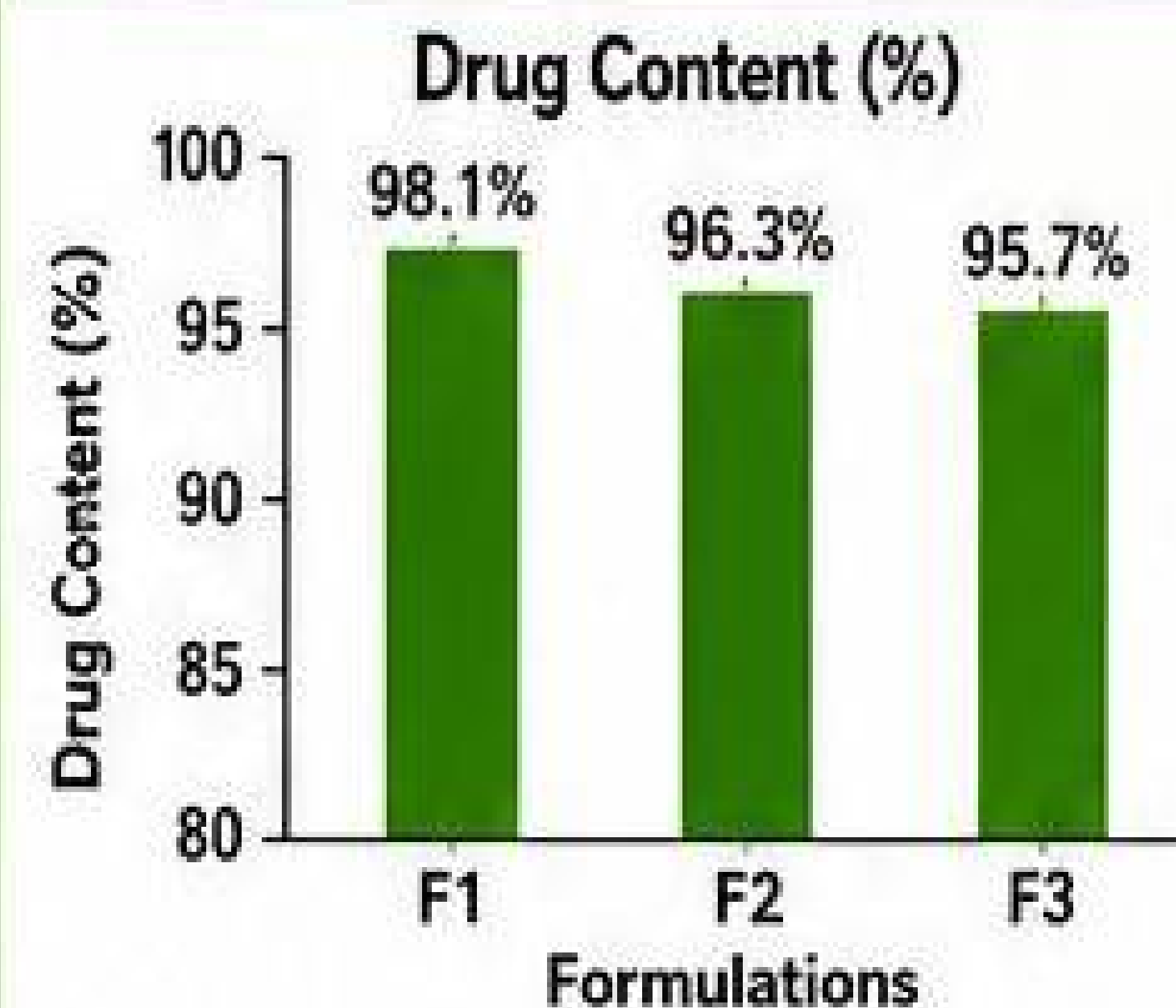
Preparation of Drug-Loaded Films (Solvent Casting Method)



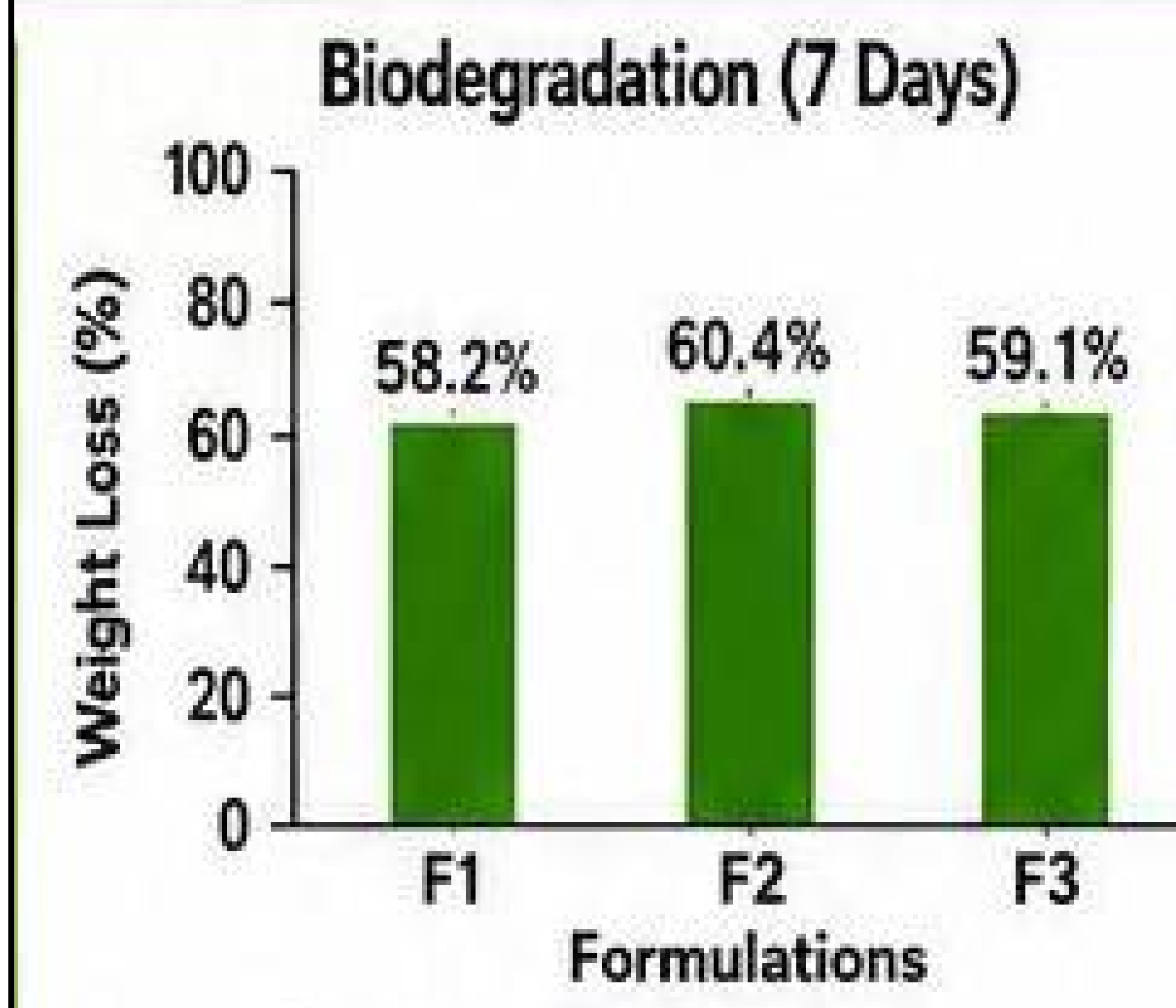
EVALUATION PARAMETERS



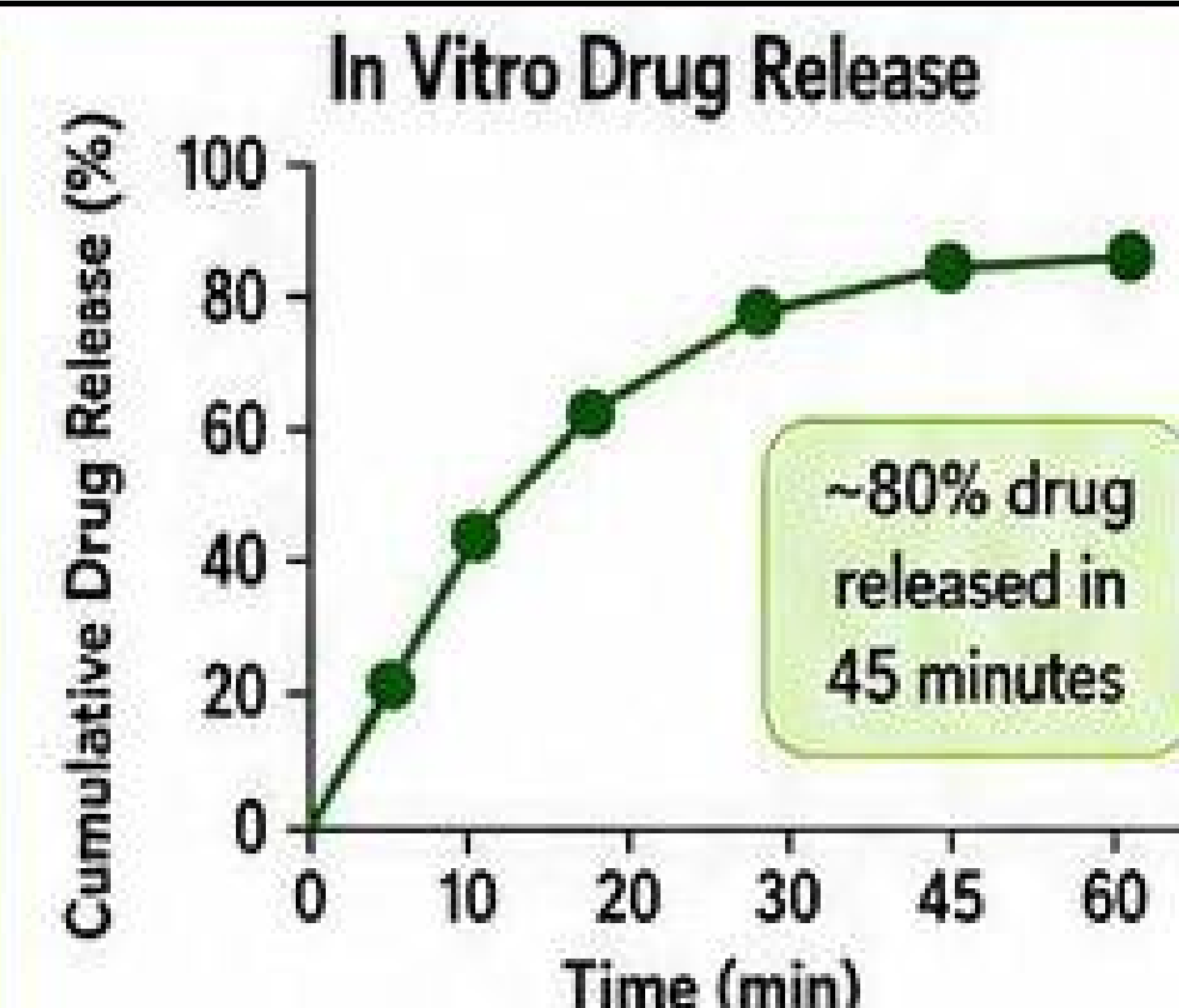
RESULTS AND DISCUSSION



Drug content ranged from 95 to 98%.



Approximately 60% degradation in 7 days.



Efficient and controlled release behavior observed.

Stability (Normal Conditions)



DISCUSSION



- | | |
|------------------------------------|--|
| Sustainable Alternative | The use of natural polymers (chitosan and starch) reduces reliance on synthetic polymers, minimizing environmental pollution and supporting eco-friendly pharmaceutical practices. |
| Effective Drug Delivery | The formulations exhibited high drug content and controlled release, ensuring effective therapeutic performance of paracetamol. |
| Environmental Compatibility | The significant biodegradation (~60% in 7 days) confirms the environmental friendliness and reduced ecological footprint of the polymeric films. |
| Stability Assurance | Stable drug content and physical appearance under normal conditions indicate suitability for practical storage and real-world application. |
| Alignment with Global Goals | This study supports the United Nations Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health) and SDG 12 (Responsible Consumption and Production). |

CONCLUSION

High drug content (95–98%) and controlled release (~80% in 45 min).

Significant biodegradation (~60% in 7 days) demonstrates environmental friendliness.

No changes in drug content or appearance during stability studies.

This approach reduces environmental burden and promotes sustainable material use.

The study highlights the potential of green pharmaceutical technologies in improving human health while preserving the environment.

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KEY TAKEAWAY

Biodegradable polymer-based drug delivery systems provide an effective and environmentally sustainable alternative to synthetic materials, ensuring controlled drug release while reducing ecological impact and supporting green pharmaceutical innovation.

