Ecoheat: Solar Cooker for Sustainable Development

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ABSTRACT

Solar cooking is becoming more popular as an eco- friendly substitute for conventional cooking techniques as a result of growing concerns about environmental damage and rising energy prices. Utilizing the sun's energy to cook food, solar cookers provide an economical, environmentally friendly, and energy-efficient cooking option, especially in areas with plenty of sunshine. The effectiveness and efficiency of a solar cooker were examined in this study focusing on variables including cooking time, temperature control and energy savings. On bright, sunny days, the solar cooker reached boiling point (100°C) in an average of 40 to 50 minutes. Cooking times rose to 70 to 90 minutes on overcast days. During the hottest parts of the day, the cooker's maximum temperature was 120°C. The solar cooker was shown to use 70–80% less energy than conventional cooking methods because it doesn't require fossil fuels or power. This study emphasizes how solar cookers can support sustainability and energy efficiency with small environmental impact and low operating expenses.

Keywords: Solar Cooker, Conventional Cooking, Eco-Friendly, Carbon Emissions.

INTRODUCTION

Conventional cooking techniques increase energy consumption, carbon emissions, and fuel prices because they mostly rely on electricity and fossil fuels. Solar cooking, on the other hand, offers a viable substitute that uses the sun's plentiful and free energy to prepare meals. Particularly in areas with strong solar insolation, solar cookers which heat and prepare food using solar radiation offer a hygienic, economical, and ecologically responsible alternative.

OBJECTIVE

The objective of solar cooker is to capture sunlight, transform it into heat, and then concentrate or hold onto that heat for cooking. They offer an inexpensive, eco-friendly cooking option and can be utilized in locations with lots of sunlight.

METHODOLOGY

- The primary structure for containing the insulating and reflecting elements is a cardboard or wooden box.
- Sunlight is focused into the cooking chamber using reflective material.
- The top of the box is covered with transparent glass, which traps heat inside while letting sunlight in.
- The box was filled with insulating material to increase the thermal efficiency of the cooker and stop heat loss.
- The interior surface of the cooking pot or tray was painted black since black surfaces are better at absorbing and holding heat.
- The food was placed inside the cooker using a black pot.

RESULT

Weather	Temperature Achieved Inside the Cooker (°C)	Cooking Time (min)	Reduction in Energy Consumption (%)
Moderate Sunny days	100	40–50	70–80
Peak Sunlight	120	30-40	

CONCLUSION

- By using the sun's free energy instead of electricity or fossil fuels, the Solar cooker is an good energy-efficient cooking option.
- Solar cooker save money on energy bills over time because they don't require fuel or power.
- The cooker's utilization of solar radiation results in zero emissions and a small carbon footprint, which helps to mitigate climate change and lower household carbon emissions.
- With a maximum cooking temperature of 120°C, the cooker works well in direct sunshine and may be used for a variety of cooking methods, including boiling, baking, and steaming.
- In locations with limited access to power or cooking fuel, such as community kitchens, rural areas, and off-grid applications, the solar cooker can be expanded.

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