

# Popular Science Summary:

## Toward Sustainable Food Preservation: Solar Drying in Rural Bhutan

for the following Master's Thesis at Lund University:

### Enhancing Post-Harvest Preservation through Improved and Even Solar Drying:

#### A Case Study in Bhutan

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In many parts of the world, preserving food is a big challenge, especially in places with limited access to electricity. This thesis focuses on improving a solar food dryer designed to help local farmers in Bhutan preserve their produce more effectively and sustainably.

Solar dryers use the sun's energy to remove moisture from fruits and vegetables, preventing spoilage and extending their shelf life. Traditional methods of drying food, such as open-air drying, can be inefficient and lead to contamination. The thesis is part of a long-term project aiming to develop a low-cost solar-driven food dryer that will improve food preservation in the Himalayan region.

This study focused on optimizing the dryer's performance to achieve more uniform drying by evaluating airflow and heat distribution. Drying experiments with bananas and chilies showed that different foods require specific drying parameters. For example, bananas were safe to store after a day, but chilies took several days. This means that drying settings need to be adjusted for each type of food.

Several different fan setups were tested to find the best balance between fast drying and making sure everything dries evenly. Reversible fans showed promise but further research into their potential is necessary. Fans use very little power, and by using ones that run on solar energy, the dryer could be entirely powered by the sun. This would make it cheaper and more sustainable, especially for remote areas.

Although the study provides promising results, further research is needed to optimize operation and design. Additionally, conducting computational fluid dynamics (CFD) analyses could offer deeper insights into airflow patterns within the dryer, leading to further optimizations.

This improved solar dryer holds the potential to significantly benefit local communities by reducing food waste, improving food security, and providing a reliable method for preserving agricultural produce in a sustainable manner.