

Four Master thesis opportunities in: Solar drying of food in Nepal and Bhutan

In a project, funded by the Swedish Research Council (VR) we are aiming to develop improved solar dryers for crop drying. The dryers should, have short drying time, and be socially accepted by the smallholder farmers in Bhutan and Nepal. Solar drying, with its potential of preserving food in an environmentally friendly way, is a much-needed technology since agriculture is the main source of income for approximately 65 % of the population in these countries. Today a relatively large fraction of the produced crops is ruined before it is consumed. Poor drying technique leads to mold and fungi attacks on the crops. Additionally, poor drying technique leads to low quality product that pays little on the export market.

Diploma work to be carried out spring 2023

1. Design

This diploma work will focus on the next generation solar dryer in the project. The student is expected to physically build a solar dryer and perform full scale testing.

- Larger solar absorber.
- Integrated heat exchanger in metal/plastic.
- Internal fans for increased heat and mass transfer.

The work can be carried out in Sweden or in Bhutan. We have funding from Linnaeus-Palme that covers most of the costs for a student travelling to Bhutan for approximately 14 weeks.

Alternatively the student can apply for funding from external scholarships. This can be if the student would like to stay a shorter time or if the student prefers to travel to Nepal rather than to Bhutan.

This work is preferably carried out by two students.

Supervisor / Examiner: Henrik Davidsson / Martin Andersson

2. Food testing

This diploma work will focus on drying of different types of food.

- Sensory testing, how nice does the dried food really taste?

- Extensive literature review. What temperatures are preferred for different types of food? How does the drying temperature affect the taste and texture?
How does the drying temperature affect the vitamin content?

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Alternatively the student can apply for funding from external scholarships. This can be if the student would like to stay a shorter time or if the student prefers to travel to Nepal rather than to Bhutan.

This work can be carried out by one or two students.

Supervisor / Examiner: Henrik Davidsson / Martin Andersson
Co-supervisor: Paula Viola (Dep. Food Science)

3. Modeling in COMSOL or OpenForm:

This diploma work will mainly be concerned with simulations using state of the art simulation tools.

The work will be to simulate different details in the dryer. This can be for instance:

- Solar absorber.
- Integrated heat exchanger in plastic.
- Smaller holes in the internal sides. (Explain later)

One way to increase the heat transfer rate from the absorber to the air is to disturb the airflow as it passes over the absorber. The same technique can be used for the heat exchanger. How could the heat transfer be optimized?

Smaller holes can be drilled in the dryer in order to disturb the air inside the dryer. How large effect can this be estimated to have and how should such holes be made for optimal heat transfer?

This work should, if possible, take advantage of results from diploma work 1, see above.

The work should mainly be carried out in Sweden. We will assist the student to find travel money for a shorter trip to Nepal or Bhutan.

This work is preferably carried out by one student.

Supervisor / Examiner: Martin Andersson / Henrik Davidsson

Diploma work to be carried out autumn 2023

4. Excel based program:

This diploma work starts with the output/measurement results from diploma work 1-3, see above.

The main tasks will be to:

- Fit experimental findings to an Excel based calculation tool.
- Carry out calculations for different weather data in different locations.
- Finding the easiest and the cheapest way to improve the solar dryer.

Supervisor / Examiner: Henrik Davidsson / Martin Andersson

Interested students are welcome to contact:

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