

Seed Money Project: 'Design of a simple greenhouse system for optimized vegetable production in the Kathmandu Valley (Nepal)'

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Why a seed money project on protected horticulture in Nepal?

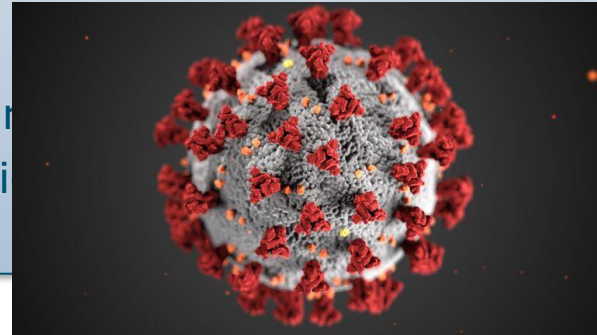
- There is an increase in vegetable production, that can be attributed to the farmer's shift of cultivation trend from cereal crops like rice to vegetable crops due to high economic returns
- A large proportion of the youth after returning to Nepal mostly from gulf countries switch their occupation to commercial farming
- Open field vegetable production faces many challenges in this region: **high incidence of pest and diseases** and therefore, **high use of pesticides, direct damage caused by heavy rainfalls, large temperature daily amplitudes**

SMP consortium

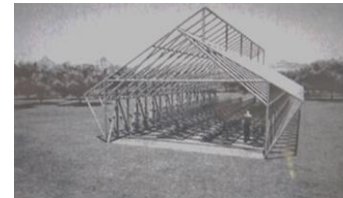
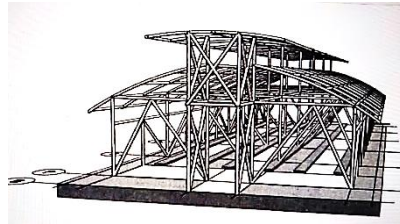
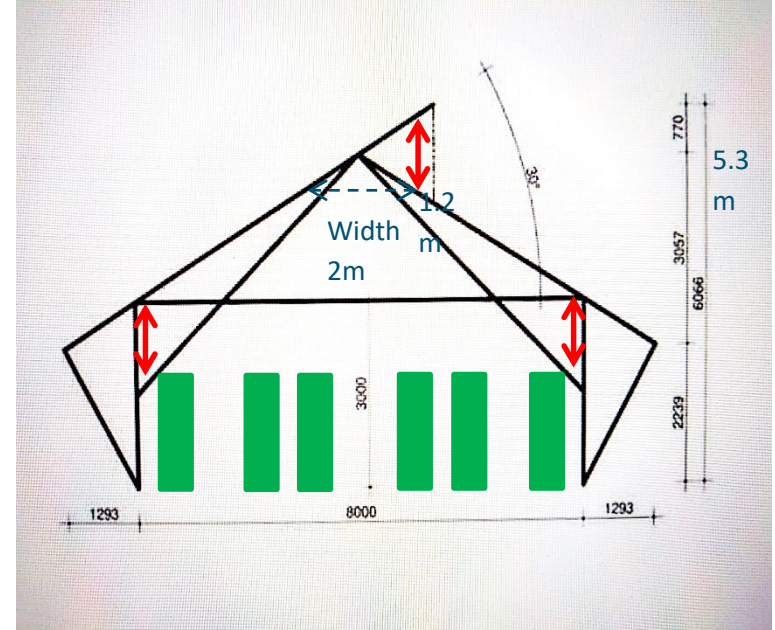
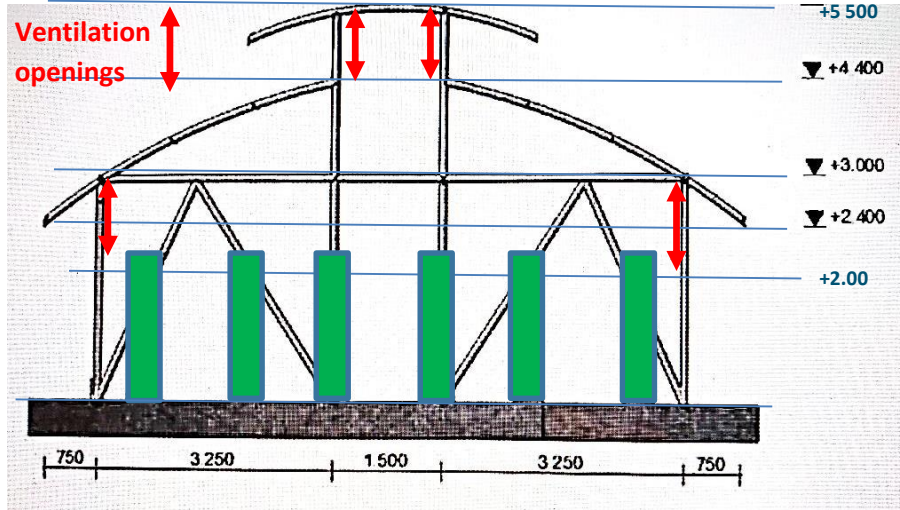


Project objectives

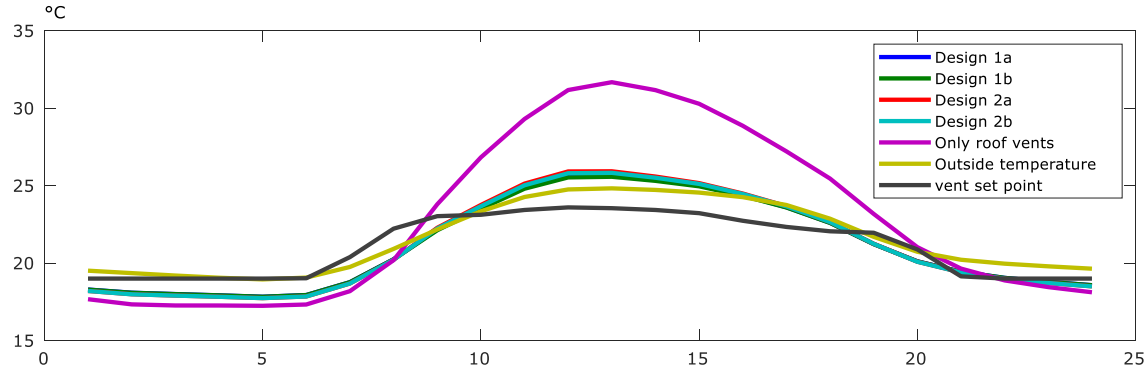
- The aim of the present work is to judge and optimize a geometrical design of a simple greenhouse cultivation system that satisfies the local conditions in the valley of Kathmandu (Nepal):
 - Climate data analysis (Kathmandu)
 - Greenhouse design(TUE, Built Environment and at Timber Research Institute-SRI)
 - Analysis of simulated greenhouse microclimate and potential yield (WUR)
- Visit to Nepal for a feasibility study for the construction of a prototype of a greenhouse design



Designs

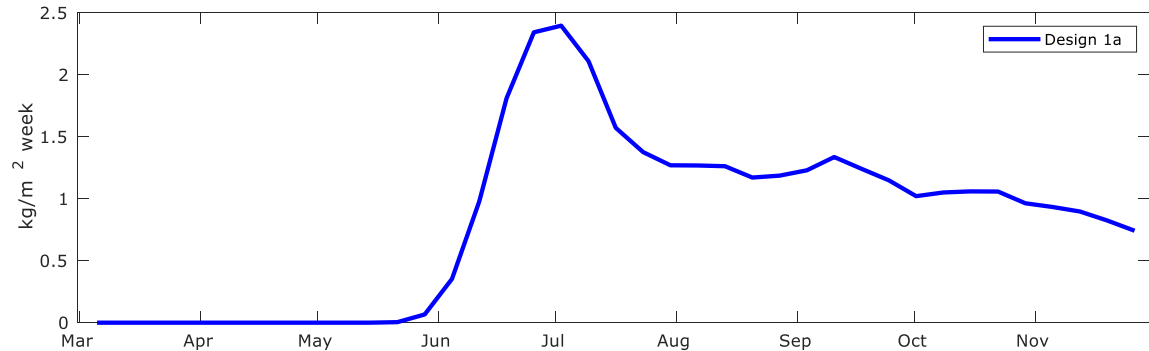


Simulation of the microclimate and yield



TEMPERATURES
SUMMER PERIOD

The most optimal crop production is predicted at a level of about 35 kg/m² for a cultivation period between March 1 and November 30.



Simplified cost/benefit analysis

Area (m2)		500	Yield correction factor	0.5		<i>source of information</i>
		Potential yield(kg/m2)	33	Realistic yield(kg/m2)	16.5	N-Agro
		Price product(NR/kg)	75			
		Income(NR/m2)	1237.5			
			depreciation	maintenance	interest rate	annual costs
	NPR	investment [NR/m2]	[%/year]	[%/year]	[%/year]	investments [NR/m2/year]
Bamboo greenhouse & simple fertigation system (1 ropani-500 sqm)	NPR 300000	600.00	17.00	0.50	9.50	NPR 162.00
			NRs	NR/m2		
Seeds			NPR 2,500.00	NPR 5.00		
FYM	2500 kg		NPR 10,000.00	NPR 20.00		
Fertilizers			NPR 2,500.00	NPR 5.00		
Agro Chemicals			NPR 10,000.00	NPR 20.00		
Water			NPR 1,000.00	NPR 2.00		
Labor Cost			NPR 144,000.00	NPR 288.00		
Total (opex)			NPR 170,000.00	NPR 340.00		
Net income(NR/m2)	NPR 735.50					

Conclusions

1. The greenhouse climate in the designed bamboo greenhouses with passive chimney effect ventilation with insect screens (buoyance ventilation) proves to be well suited for crop production from March to November.
2. A fixed internal low emissivity screen closed during the night will improve crop temperature aiming at prevention of diseases in critical periods.
3. Rough cost/benefit analysis very positive, even if 50% of potential yield is only achieved
4. It is crucial to realize these greenhouse designs in Nepal to test and improve them, gain expertise on crop production strategies in these greenhouses and spread know how to the growers.

Future activities within SMP (2021)

- 1. Build a small-scale prototype of the greenhouse in The Netherlands to test the plastic film fixation system (first three months of 2021)**
- 2. Traveling is very unlikely so, alternatively, we will organize a one day online a training/ survey meeting with the public – private sector in Nepal as for SMP making a greenhouse sector survey, exchanging opinions, and looking for opportunities to continue working together and testing improved bamboo greenhouses**

Future activities after SMP (2021 and beyond)

1. N-Agro and Ministry of Agriculture of Nepal will find a location in an expertise centre to build a prototype of the bamboo greenhouse in Nepal. Companies can support in kind the cost of construction with some material (plastic film, insect screens, screens, substrate, sensors,...).
2. This real scale testing will serve also to develop crop growth strategies and spread information to local constructors and growers
3. Crop growth cycles will be performed under the supervision of local students/researchers which will be advised online from distance by WUR Greenhouse Horticulture.

AND THEN?

- RVO DHI, Demonstration, Feasibility, Investment project (lead by ENZA Zaden? + Priva, Koppert, Hyplast, Ludvig Svensson, PUM, and Agriterro).
- Too early to present a RVO SGD Partnership, but perhaps later with participation of Nepalese government.

Thanks for your attention!

Any questions?

