Protective Structures

Summary

Protective structures can increase farmer incomes by allowing production of high quality vegetables, particularly during the wet season when market prices are high. Vegetables grown under protective structures in Leyte, Samar, Bohol and Mindanao consistently yielded higher than those grown in the open field. In most cases these protective structure trials also resulted in higher gross margins, particularly in the wet season.

Advantages of protective structures

- Produces vegetables year round
- Production of healthy and quality seedlings
- Less disease
- Less weeds
- Less leaching of nutrients
- Better crop establishment
- Better soil conditions for plant growth
- Increase yield and income- especially in the wet season
- Supports production of safe and clean vegetables
- Allows reduction of fertilizer use

House-type protective structures

This house-like structure provides enough height for taller growing crops such as cucurbits, string beans, tomatoes and sweet pepper. The sides are left open to allow for ventilation. The structure can be built from bamboo (which is stronger than coco lumber), and the roof covered with UV treated plastic that lasts for 3-5 years. The roof can be curved, or flat with a ventilation gap in the peak of the roof.

House-type structures can be made with a curved roof (top), or flat roof with a ventilation gap (bottom).

Case Study

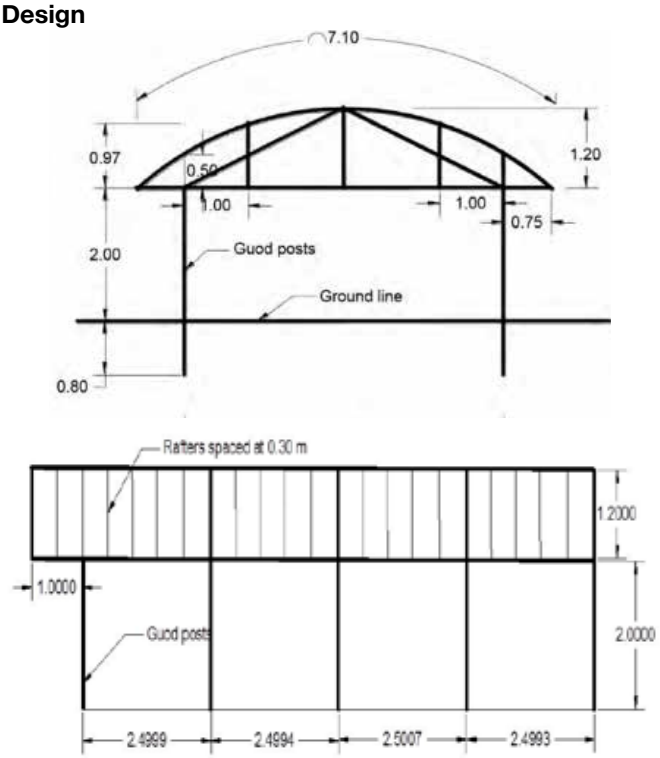
Mr Boie Gerona is a vegetable farmer in Bontoc, Leyte. Boie has developed four house-style structures and many low tunnels that enable him to produce vegetables year round.

Boie's initial attempts to grow vegetables often failed and/or were non-profitable. Among the many constraints, he found continuous heavy rains the most difficult to manage. However, his use of protective structures has allowed him to grow vegetables through the wet season, allowing him to market his produce when prices are higher.

Boie consistently finds that yields of lettuce, ampalaya, and sweet pepper, are higher than the open field. Gross margins of crops grown under the structures are nearly three-fold more than the open field.

Boie Gerona with the structure he designed to withstand strong wind and rain.

Design



Front and side views of the house-type protective structure with an effective growing area of 200m².

Impact

Under house-type protective structures, increased yields of cauliflower, green onion, lettuce, chilli pepper, tomato, sweet pepper, bitter gourd, pechay, muskmelon, broccoli and string beans have been noted. Trials with growers resulted in:

- An increase of 400% in tomato production (Cabintan, Ormoc City)
- Half of the cost of the structure recovered in one cropping of tomato (Lao, Ormoc City)
- Overcoming the challenge of off-season planting during the wet-season (Bontoc, Southern Leyte)

Costs

Cost of materials of bamboo house with footing and drip irrigation system (5m X 40m)

Description/Materials	Quantity	Unit	Unit Price (PhP)	Cost (PhP)
A. Basic Structure				
2.5 m Bamboo posts (Guod)	34	pcs	40	1,360
Matured bamboo poles (Kayale)	130	poles	100	13,000
Nylon # 100	10	kgs	350	3,500
Black strap	3	rolls	2,500	7,500
Common nails (6")	2	kgs	55	110
Common nails (4")	12	kgs	64	768
Common nails (2")	5	kgs	76	380
No. 60 binder clip	20	boxes	60	1,200
PE UV plastic 110"x0.005"x150m	1	roll	10,000	10,000
Drip hose	1	roll	4,500	4,500
Various Connector	9	pcs	30	270
PE pipe (3/4")	10	m	35	350
B. Footing (Optional)				
Pozzolan cement	10	bags	220	2,200
10 mm Reinforcement bars	10	lengths	156	1,560
8 mm Reinforcement bars	12	lengths	62	744
C. Labor and Transport				
Construction of the structure*	1	unit	12,000	12,000
Installation of irrigation system	1	unit	350	350
TOTAL				**59,792**

Net tunnel

1. Twin-Bed Net Tunnel

This structure is roofed with UV treated net which can last longer than UV treated plastic. The frame/arc is made of galvanized iron pipe (3/4") using the whole length (20ft), moulded and bent to form an arc. This is recommended for medium stand crops like solanaceous crops.

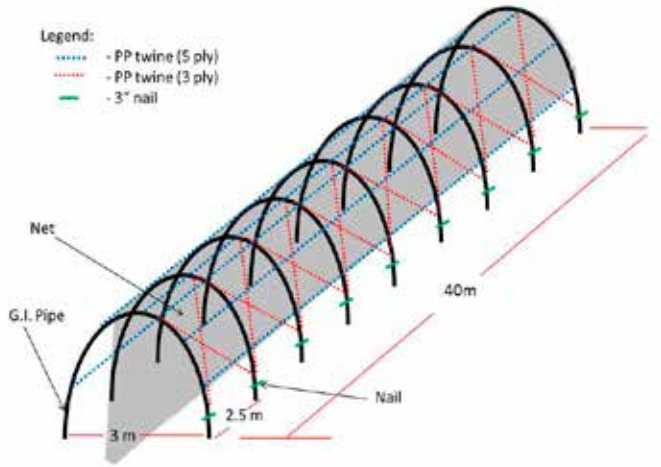
This structure is more resistant to strong winds than the plastic-roofed house, and although the roofing is permeable to water, there is a reduction of rain drop impact onto the plant and soil.

Costs

Cost of materials of twin bed net tunnel (3m X 40m)

Description	Quantity	Unit	Unit Price (PhP)	Cost (PhP)
Materials				
A. Basic Structure				
G.I. pipe	21	length	320	6720
Net roofing	44	meter	167	7326
PEP twine	5	roll	185	925
B. Labor and Transport				
Fabrication of Arc	2	man-day	300	600
Installation of structure	1	man-day	300	300
TOTAL				**15871**

Design



Twin bed tunnel design with an effective growing area of 120m².

3. Low Net Tunnel

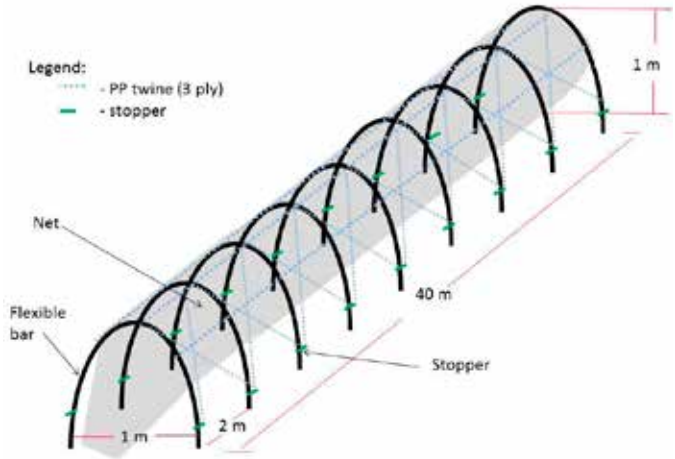
Design

The low tunnel is recommended for low-lying crops such as brassicas, kangkong, carrots, radish and lettuce. The structure is cheap to construct and can be easily removed during the dry season. The net roofing minimizes the impact of rain drops on the plant, and also prevents soil splash to leafy vegetables during heavy rain. The shading from the netting can also increase survival rates of newly transplanted seedlings.

Costs

Cost of materials of low tunnel with net roofing (1m x 40m)

Description/Materials	Qty	Unit	Unit Price	Cost (PhP)
A. Basic Structure				
Flexi bar	21	pcs	90	1890
Net roofing	42	meter	23	962
PEP twine	0.5	roll	140	70
B. Labor				
Installation of structure	1	man-day	300	300
TOTAL				3222



Low tunnel design with an effective growing area of 40m^2. The frame/arc can be made with bamboo or 12mm flexible round stainless steel coated bar that can be manually bent to form an arc.

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