Role of Passive Solar Green Houses in Nutrition Sensitive Agriculture in Mountains

Mohammed Deen Darokhan
President LEHO
(LEHO:Ladakh Environmental & Health Organization, Leh, Ladakh, India)
Nutrition Sensitive Agriculture is the production of safe and healthy food in a healthy environment on sustainable basis

It can be achieved through:-

- Organic farming and production
- Diversified Agriculture
- Integrated agriculture and livestock farming

Factors effecting Nutrition Sensitive Agriculture

- Mono Culture
- Chemical farming
- Processing of food.
Mountain communities face challenges due to:
- Inaccessibility
- Harsh climatic conditions
- Limited land holdings

**Nutrition status in mountains shows two different scenarios**

**In Summer**
The diet is nutritive & balanced

**In Winter**
- Temperature is below zero, impossible to grow anything outside.
- Traditional practices to preserve food, (drying, pickling *etc*) not sufficient to provide all the required nutrients

Mountain communities therefore often suffer from malnutrition and micronutrient deficiency
Improved Design Passive Solar Greenhouse (IGH)

High tech greenhouses are transparent structures with electronic system to control suitable temperature to grow crops throughout the year.

IGHs on the other hand are heated entirely by sunlight. They are constructed facing south with a polythene or glass cover to receive maximum sunlight in the day time.

Features of IGHs

- A major fraction of sunlight is absorbed by vegetable crops and other objects like inner wall and soil in the bed. These objects in turn emit long wave thermal radiations, most of which is blocked by the cover and results in rise in temperature inside the greenhouse.

- Double wall allows the heat storage in inner wall and not let the heat escape through conduction.

- Night insulation is used to minimize heat loss during night and then to protect plant from freezing.
Development of IGHs by LEHO

- LEHO has been working on the development of improved greenhouses suitable for mountains for last 2 decades in Ladakh.
- With local NGO network, LEHO has constructed >1000 improved greenhouses in the region.

The key points of success of IGHs developed by LEHO are:

- Energy-efficient as the structure sustains itself by picking up and storing solar radiation and does not need extra heating during winter.
- Affordable and sustainable in the long-run.
- Based on material locally sourced, simple to build and easy to maintain.

- LEHO has also developed guides book for construction & management of IGHs.
- LEHO also provides consultation for construction & management of green houses.
Fruits & green leafy vegetables can be grown inside the greenhouse throughout the winters.

Extends the growing period resulting in better income from agriculture.

Most of the produce from greenhouses is organic.

It is the most suitable technologies to solve nutrition deficiency and food security.

Has environmental impact by reducing carbon emissions.
Impact of Passive Solar Greenhouse in Ladakh

• The technology has brought a revolution for production of green vegetables during winter and improved the income from the crop field.
• For some farmers the greenhouses are the only source of income during winter to sustain their family.

• Each green house produces 170kg of vegetables.
• A farmer can earn up to 8000 INR in the winter months from selling vegetables & 10,000 INR from seedling production in spring.
• In autumn, this greenhouse can be used for Apricot drying, benefitting 45,000 INR annually.
Ladakh

**Ladakh is semi arid cold desert**

Situated in the Himalayas in the northern most part of India, it lies at an altitude of 9000 to 14000 ft above sea level and covers a geographical areas of ~60,000 Sq Km.

**Challenges due to its geographical location**

- The cropping season is limited to 5 months (May to September)
- The temperature goes down to -30°C in winter, agriculture not possible
- The region remains cut off for more than six months in a year from rest of the country due to snow blocking the highways
- Vegetable and fruits difficult to procure in winters
Policy Changes to Achieve Nutrition Sensitive Agriculture

Organic food production and farming is nutrition sensitive agriculture. The success of organic agriculture would need a policy or law to check the threats.

The dissemination of the technology in all parts of the region needs joint effort by government agencies, NGOS and other private players in vegetable business.
THANK YOU