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AQUAGEOPONICS: A SYSTEM ENCOURAGE COASTAL LIVLIHOOD

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Aquageoponics

Fish production plays an important role in people's daily diet, contributing 60% of the national animal protein supply, representing a crucial source of micro-nutrients. Therefore, various aquaculture techniques have been evolved. One among them was Aquageoponics. The word 'aquaponics' is a combination of 'aquaculture' (fish farming) and hydroponics (cultivation in water). It raises both vegetables and fish in a limited space at a relatively low financial cost by adding diversification in culture technique (Nelson, 2008). Throughout the year this technique can be carried out. Monoculture systems rely mainly on external inputs while in Aquageoponics, recycling of nutrients takes place that helps in reducing the cost of production for economic yield. It allows both the crops and vegetables to grow fast. It enables three cycles of production in a year. It can be an innovative way to generate income and food.

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History

Filling the gap of supply and demand of fish and vegetables for improving household nutrition, the ANEP (Agriculture and Nutrition Extension Project) funded by the European Union (EU) works in Barisal District of Bangladesh following an integrated aquaculture agriculture approach. Pond dykes in Barisal are commonly used for planting trees by the rural people which provide cooking fuel, fruits, and timber for sale. Trees on the pond dyke create shadow, which reduces sunlight penetration to the edges of the pond and the dykes. In the whole process of action research, farmers, researchers, and developers from Bangladesh Agricultural University (BAU), Mymensingh, Patuakhali Science and Technology University, Bangladesh, WorldFish-ANEP, and Bangladesh Fisheries Research Forum (BFRF) together were involved in the trial of this technology. The concept of IFCAS was developed by Dr. M. Mahfujul Haque (Ripon), Professor, Department of Aquaculture, BAU, Mymensingh who led the action research as the Principal Investigator.

Site Selection and Pond preparation

Shaded ponds were selected. The bottom topography of ponds should be regular so that it is possible to grow vegetables on the dike of any of the selected ponds due to the presence of large tree roots. Initially, undesirable aquatic weeds and floating debris should be removed from the selected ponds. Ponds were treated with lime ($CaCO_3$) at the rate of 247 kg ha^{-1}.

Design and structure of the cages

A three-square meter (1.52 m × 2.12 m) frame was constructed by bamboo-split. The bottom of the cage frame was formed by a rectangular nylon net with a weight of brick in four corners. On three sides of the cages, there was an area for horticulture. Above the cage, a horizontal trellis was built to support climbing plants. Of the four sides of the trellis and cage, one side was left open for sunlight penetration and easy collection of fish and vegetables. Three sides of the trellis and cage were extended 12 in. with a bamboo frame and net roof (like the sunshade of a building). A mixture of dried pond sludge, cow dung, and other

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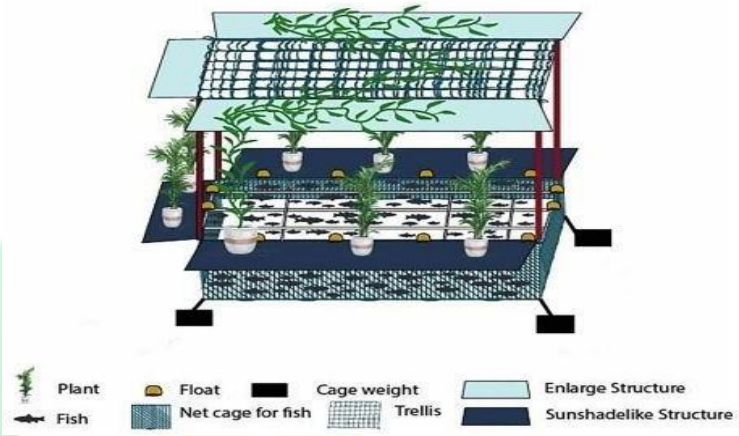
manure was placed to plant crops. Several holes were made for access of the roots to pond water. 15–20 Plastic bottles each having 10 L or 15 L floating capacity were attached for flotation.Regarding stocking in aquageoponics system, Professor Dr. M. Mahfujul Haque recommends for monosex Tilapia of 100 fries per cubic meter. For vegetables, cucumber, bean, bitter melon, Asian spinach are recommended.



Coastal Agriculture in India

The vast coastal region of India with abundant rainfall finding its way into local streams or boosting water supplies to rivers that have originated elsewhere in Peninsular region that forms deltas at the confluence of the river with oceans and of course back-water streams have favored the growth of agriculture that is known for biodiversity richness. This diversity was reflected in farming too that often provides sustenance mechanisms to it. Farming outputs of coastal regions comprise not only crops but also livestock products and fisheries (fresh/brackish water, marine fisheries). Livestock rearing and marine fishing are done by landless people, thus nonfarmers too derive livelihoods from farming. Marine fishing and brackish water aquaculture are exclusive to this region.

Area and production of the vegetables grown in coastal states of India Source:

Vegetable crop	Area (000, ha)	Production (000, T)
Andhra Pradesh	243.04	243.04

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Gujrat	613.13	12254.29
Karnataka	483.20	8394.15
Kerala	110.79	2516.47
Maharashtra	726.20	12306.72
Odisha	639.70	8766.82
Tamil Nadu	240.95	6396.01
West Bengal	1400.26	27695.29
Total	**4457.27**	**78572.79**

Source: Horticulture Statistics, 2018

Future prospectus

Coastal vegetation can be a potential option to reduce coastal vulnerability to natural and artificial hazards. Conservation and management of the coastal features require knowledge about geomorphic domains existing in the coastline and their usage.Training programs regarding Aquageoponics should be conducted and educate local fisherfolk. The researcher should work in various divisions and make this technology standard.

Advantages

❖ It improves space utilization and increases productivity per unit area.

❖ It provides diversified products.

❖ It enables three cycles of production in a year.

❖ Utilization of crop residues and livestock wastes.

❖less reliance on outside inputs such as fertilizers, agrochemicals, feed, etc. ❖ Increase profits by reducing production costs.

❖ It provides diversified income sources, guaranteeing a buffer against climate fluctuations.

Conclusion

Aquageoponics is the only approach that can enable Indian farmers self-sufficient and competitive in the global market by producing quality edible products.More research is needed to extend the use of this integrated floating system and implement it commercially. Many coastal resources were not utilized properly. By adopting this innovative technology,

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the problem can be cracked.This technology is not only applicable in ponds but also may be applied in beels (static lake), river, haor (depression of shallow water), baor (oxbow lake), and other water bodies if the security of the aquaponics system can be maintained.

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