



Anirban with his
'no-pesticide' plants

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Photo: Dhrubajyoti Ghosh

Vegetables; and Truly Green

Dhrubajyoti Ghosh

In 1962, exactly 50 years ago, Rachel Carson shook the world with her book 'Silent Spring', not just sensitizing the world about the ongoing devastation of ecology and ecosystems but also, arguably, giving birth to 'environmentalism' as a new area for activism and intellectual attention. The focus of Rachel Carson's research was the crisis in agriculture caused by overuse of pesticides. Commemorating the 50th anniversary of the publication of 'Silent Spring', Rob Dunn reminded in 'Nature' (Volume no. 485, May 2012) that: "it was the misuse of DDT that had provoked Carson to action." He also said "the agro-chemical industry spent hundreds of thousands of dollars to fight the book's message."

Since then, the barons of agri-business have left no stone unturned to diffuse perceptions about the impact of their business. These leaders of capital and finance have invaded every environmental cause with their 'support', from the Stockholm Conference to other important environment-related conferences since 1972. Policy makers from across the world, 'leading'

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environmentalists and political luminaries attend such conferences in exotic places to debate the state of the 'environment'. Agro-chemical companies spend humungous amounts to confuse and derail the focus of environmental movements and research. Even in India, despite the vociferous pro-environment movement, very little has happened to effectively curb the phenomenal increase in the use of agro-chemicals and pesticides since the 1970s in the name of green revolution.

Yet there are efforts across the country that go against the tide and act to honour the memory of Rachel Carson. There are small efforts all over to produce safe food, free from the ill effects of pesticides and agro-chemicals. Often these heroic efforts get lost in the rough and tumble of everyday life and reporting.

On a sweltering and uninviting afternoon this May, I chanced upon one of them in the heart of South Calcutta: on the rooftop of Anirban Chanda's office. Anirban is a first-generation entrepreneur specializing in aquaponics on his 90 square meter vegetable garden. Rooftop gardens are not exactly

rare; in the metropolises of India, one in a thousand roofs may sport such gardens; green apartments sport them as part of their unique selling proposition. Anirban's garden is unique, possibly the only one in the country that displays a variety of aquaponic systems and boasts of an amazing ensemble of seasonal vegetables. Tomatoes, cucumbers, bitter gourds, bottle gourds, kohlrabi, cauliflower, cabbages, red and green spinach, chillies, capsicum, cherry, basil, green beans, brinjal, ridge gourds, pumpkins, lettuce, turnips, papayas and several seasonal flowers and herbs.

He breeds fish on his rooftop as well: Telapia and Magur that share a symbiotic relationship with the plants breed there. What sets the garden apart from usual rooftop greens is that its system uses less water than traditional land gardens, requires much less man hours for being tended to and grows vegetables in greater density than a traditional soil-based garden. Anirban says that his system is "appropriately Indianized, hand made and costs less to build and run than most other aquaponic systems available worldwide."

It has taken Anirban about three years to develop his garden to produce vegetables without any pesticides or agro-chemicals by using aquaponics, a symbiotic combination of organic aquaculture and hydroponics. Simply put, it is about breeding fishes and growing plants in a symbiotic system. Anirban rears fishes in tanks to generate ammonia that is filtered to keep them alive. The aquaponics here involves a closed system, substrate-based bio-filtration technique to remove ammonia by using nitrification bacteria that converts ammonia into nitrites and nitrates which are then provided to plants (vegetables). What results is an organically grown product that needs no soil while the clean water is returned to the fish tank closing the cycle. Anirban's aquaponic system produces both edible fish and organic vegetables at the same time.

Anirban was motivated to assemble this rooftop phenomenon courtesy:

- spiralling food cost
- undesirable genetic modifications of produce
- indiscriminate use of chemical fertilizers and pesticides for growing crops and
- increasing shortage of clean and uncontaminated





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agricultural land besides high and fluctuating prices of vegetables.

Anirban uses stonechips as substrate because stonechips are cheap and easily available. Black stonechip is beneficial for the bacteria that is light sensitive. While experts say that hydroton (leca) is the ideal medium, it is almost five times more expensive than the gravel). Some countries use lava rock. Anirban adds no nutrient: "No chemicals at all." The only things he adds to the system "is oxygen via an air pump if required, food for the fish (mainly *Telapia* and *Magur*), earthworms to the plant beds to mineralize solids and keep the root systems clean and water top ups as required." The plants draw nutrition from the converted ammonia rich fish waste and leftover fish food converted by nitrifying bacteria and well oxygenated water. The fish feed comprises duck weed, black soldier fly larva and fish food that can be made at home.

While the economics of the project has not been professionally worked out, the arithmetic is clear in Anirban's mind. A single unit requires less than 10 minutes a day of maintenance, fish feeding requires less than a minute, a once-in-three days

maintenance schedule requires about 15 minutes. One full time person is enough to look after an area of about 45 sq metres easily, with time to spare and some occasional help and it needs no tillable land.

Aquaponics can also use vertical spaces very effectively and does not require any investment on fertilizer or pesticide. Water is lost only in evapotranspiration. Very importantly, a large benefit accrues from averting healthcare costs. People in cities and villages have been suffering from pesticide and fertilizer related diseases and research in these areas is systematically blocked. Anirban expects that the cost of installation (Rs 4,000 to Rs 5,000 per square metre) would be recovered in five years, while operating profits can be reached within the first cycle of crop and it is likely to show greater profitability than soil-based ventures in the same area.

Kolkata is now on a beautification spree. A number of plans are being implemented especially on the riverside. What if 50 per cent of the city rooftops go green in the Anirban way? "Hanging Gardens of Babylon! I can not even begin to list: fresh clean food grown everywhere, increase in fish in the diet, less methane generating meat consumption, abundance and availability of organic produce, no premium on organic produce, lower food prices and less control of food mafia, less stomach and lung related ailments, greenery, more oxygen, lower micro climatic pollution, healthy biodiversity (small birds and insects), lower heat radiating from rooftops, cooler homes (and lower electrical consumption thereof) and lesser food miles besides discouraging the current unsustainable agricultural techniques in vegetable production. I envisage a dent in our carbon footprint as a city and a marked improvement in the health of future generations."

Surely a consummation devoutly to be wished; one that Anirban Chanda pursues through disbursement of information through a website. Learn, get trained and procure a self-help system for a green roof. Cherish Rachel Carson. ●

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