Correspondence about Tilapia Production using Periphyton Aquaculture Technology (PAT)

ECHO Inc.

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Bill Mebane corresponded with ECHO's Farm Manager Danny Blank regarding some questions about tilapia production. We excerpt some of the correspondence here, for your information.

Danny had asked for advice and feedback about ideas for a flow through, green water system using periphyton aquaculture technology (PAT), and for a stagnant green water system using PAT. He also asked about the recommended surface area and depth of a pond used for PAT.

Bill Mebane responded, "Regarding flow-through vs. static systems—the recommended turnover using PAT is no greater than once every two weeks. This number is based on available nutrients (the object is to keep enough nutrients in the pond to maintain healthy periphyton).

"As a general rule of thumb; surface area of the periphyton substrate should be equal to the surface area of the pond. Personally I do not like this "rule"; in my opinion and experience, the two limiting factors using PAT are nutrients and surface area for the periphyton to grow on, and the more of each the better—the fish will graze it to a balance. Bamboo is best for substrate, but palm fronds work in a pinch (they tend to rot faster). If the ponds are to be seined for harvest, you need to devise a method of easily removing the substrate. Hanging the bamboo on strings like wind chimes works well. The folks in Israel use removable racks of bamboo (kind of like a horizontal ladder with vertical pieces of bamboo lashed on). Tilapia are not really good filter feeders; they can do it, but morphologically they are designed to graze (scrape attached plant material). At night when it is quiet, if you dunk your head underwater you can hear them! (Be careful where you dunk!)

"Regarding the depth of ponds, the periphyton needs sunlight, so any volume of water below the level of sunlight penetration is kind of wasted. 30 cm is a good depth. Single cell algae is problematic (blocks sunlight), so anything that can be done to reduce it is good. Ideally a good filter feeder would be added (silver carp, giant Gorami, or mullet would be great polyculture candidates). We would love to experiment with this, but being in New England we are limited as to what we can import without a slew of paperwork. With ECHO's expertise, you may be able to figure out a way to add nutrients that favor macro algae, or I would be interested in using moringa seed powder to precipitate single cell algae—haven't tried this yet on a large scale because we don't have enough seed. It works at the "lab scale."

"The stocking rate we use is 2 fish/square meter of surface area of the pond and we stock sex reversed fish that are 5 to 10 grams in size. In six months these fish will be about 100 to 200 grams each, a perfect size to be pan fried, gutted and scaled with the head still on. Any bigger than this and the head gets tough to eat."

"In a nutshell—the magic formula includes sun, plant nutrients, and submerged surface area bathed in sunlight, and a method of controlling fry production. We sex reverse with testosterone-laced feed fed at 0-2 weeks of age. A few grams of testosterone will convert tens of thousands of fry. I wish there were a better method, but until we find a suitable predator or replacement for the hormone therapy, it's the best we can do. Babies will overrun the pond if one of these approaches is not used; good nutrition but not very marketable...kind of like eating swimming rice!

"One more thing: tilapia love papaya leaves and moringa (personal observation) and I've heard they like carrot tops. If nutrient level cannot be kept high enough due to water seepage etc. papaya leaves will be super helpful."

A Word of Thanks

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