

Aquaculture and Aquaponics Bi-products Towards Sustainable Agriculture

Supplemental Data

Objective:

Aquaculture and Aquaponics by-products could help to support a sustainable agriculture practice in Ohio. This study evaluated fish sludge generated in an in-pond raceway system and in an aquaponics facility as potential fertilizer.

Study Design:

Fish sludge was collected at two locations, an aquaculture facility (floating in-pond raceway system, IPRS) in a reclaimed limestone quarry in Miami County, and from an aquaponics facility in Clermont County. During 67-days of the production cycle water temperature and pH was monitored using automatic data loggers with parameters taken every hour. Fish sludge was sent for chemical analysis.

Summary:

The following table provide the monthly average water temperature and pH± standard deviation, the coefficient of variance (CV, %), and the maximum and minimum temperatures and pH for the aquaculture and the aquaponics facilities during 67-days of monitoring.

Facility	Month	N	Temperature (°C)	pH
Aquaculture	07 / 2025	296	28.31±0.72 (CV=2.55%)	8.42±0.11 (CV=1.31%)
	08 / 2025	744	26.69±1.79 (CV=6.72%)	8.81±0.40 (CV=4.50%)
	09 / 2025	543	22.47±0.50 (CV=2.23%)	8.72±0.15 (CV=1.70%)
	Total	1583	25.54±2.64 (CV=10.35%)	8.71±0.32 (CV=3.71%)
	Max	Max	29.82	9.35
	Min	Min	20.82	7.83
Aquaponics	07 / 2025	296	26.28±1.55 (CV=5.91%)	6.61±0.26 (CV=4.00%)
	08 / 2025	744	23.94±2.41 (CV=10.06%)	6.13±0.24 (CV=3.85%)
	09 / 2025	543	22.59±1.30 (CV=5.73%)	5.70±0.10 (CV=1.78%)
	Total	1583	23.92±2.33 (CV=9.72%)	6.07±0.38 (CV=6.28%)
	Max	Max	29.31	6.98
	Min	Min	19.41	5.55

Comments

- The aquaculture facility is an outdoor floating in-pond raceway system (IPRS) that has minimal control on the external environment, while the aquaponics facility is an indoor recirculating aquaculture system (RAS) that is coupled with a hydroponics system. The water quality monitoring occurred on the fish culture units.
- For the period in which the water quality was monitored it was observed that the pH in the aquaponics facility dropped from 6.98 up to 5.55; the opposite behavior was observed in the aquaculture facility where pH started at 8.22 and after 20-days jumped to 9.05, and then 20-days later dropped to an average of 8.72. The difference in pH may have impacted the biological activity occurred on the fish sludge and consequently the composition of macro and micronutrients observed in the collected samples.
- Temperature: the aquaculture facility was about 2.0-2.7 °C warmer than the aquaponics facility during the first 50-days of the monitored period, and that trend was reversed during the last 14 days of the monitored period with the aquaculture facility being in average 0.8 °C colder. Temperature also affects the biological activity on the fish sludge.

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