

Density-dependent water use in shrimp monoculture

TECHNOLOGY BRIEF

In *Litopenaeus vannamei* monoculture, with BMR at optimum stocking density of 5 lakh PL ha⁻¹, total water use (TWU) could be minimized to 32,500 m³ and water exchange to 6,300 m³ per ha, without hampering the normal growth and production. With this optimum density, shrimp productivity enhanced to a level of 10.58 t ha⁻¹ 120 d⁻¹. Further, net income of Rs.83.3 is generated per m³ of water used. It was seeming as a way to improve total water footprint (1,229 m³ t⁻¹ biomass), water use efficiency (0.58 kg biomass m⁻³ water) while minimized sediment load (45.3 m³ t⁻¹ biomass) and effluent outputs (0.63× 10⁴ m³). Ratio of output value to the cost of cultivation was 1.97.

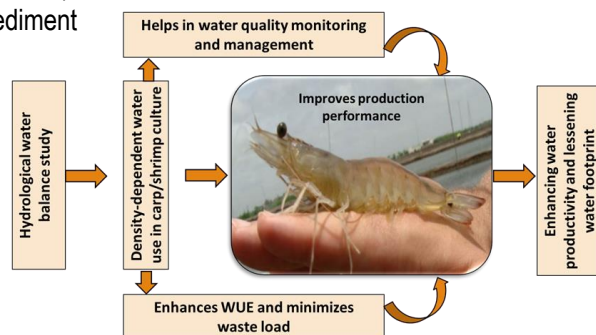
Similarly, in monoculture of *Penaeus monodon*, stocking density of 2 lakh PL ha⁻¹ gives significantly higher yield (4.58 t ha⁻¹ 125 d⁻¹), economic benefit (OV:CC, 2.46) and net consumptive water productivity (Rs.37.9 m⁻³). At this density, TWU could be minimized to 32,400 m³ and water exchange to 9,000 m³ ha⁻¹, without hampering the normal growth and production. It was seeming as a way to improve total water footprint (3515 m³ t⁻¹ biomass), water use efficiency (0.24 kg biomass m⁻³ water) while minimized sediment load (44.4 m³ t⁻¹ biomass) and effluent outputs (0.90× 10⁴ m³).

IMPACT / UTILITY

Water budgeting using hydrological water balance model would help in assessing the total water demand for brackishwater shrimp monoculture in the country. This would help in optimizing shrimp rearing efforts while the water management strategies can be tailored to improve WUE & minimize operational costs. WUE appear to be a useful indicator of efficient, environmentally responsible shrimp culture. The density-dependent demand-driven water use not only helps in improving WUE, water productivity & profitability but also important in lessening total water footprint, sediment load, effluent output, and pollution potential. This technology has the potential for implementation in around 12 lakhs ha in India as well as in other parts of south-east Asia.

HIGHLIGHTS

- In Pacific white shrimp (*Litopenaeus vannamei*) culture, only 1.72 cubic meter of water is required to production 1 kg of biomass.
- Improve water use efficiency (WUE) & water productivity.
- Lessening pollution potential, effluent output, water footprint & waste load.
- In monoculture of Black Tiger shrimp *Penaeus monodon*, 4.2 cubic meter of water is required to production 1 kg of biomass.



Project Details

Water budgeting in high value shrimp monoculture and carp poly culture under varying intensification levels (Project Code: DWM/12/155)

Publications

- Mohanty et al., (2018) *Aquacultural Engineering*, 82: 46-55
- Mohanty et al., (2017) *Aquaculture International*, 25:2161-2176
- Mohanty et al., (2015) *Aquaculture Research*, 46: 2457-2468