

NOTICE OF PUBLICATION



Title: Phosphorus fertilization strategy in fish ponds based on sediment phosphorus saturation level

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Abstract: Two experiments were conducted to determine effective P fertilization strategy in fish ponds in relation to sediment P saturation level. Experiment 1 was conducted in cement tanks with five levels of P saturation in the sediments (5, 24, 44, 60, 79%) and with three P fertilization rates (0.2, 0.1 and 0.05 g m⁻³ day⁻¹, N:P ratios of 2:1, 4:1 and 8:1, respectively). Nile tilapia (*Oreochromis niloticus*) were cultured in the tanks for 57 days. Results showed that the mean concentration of soluble reactive phosphorus (SRP) in the water column increased with increasing sediment P saturation and P fertilization rate. The maximum net fish yield (NFY), 4.2 ± 0.3 g m⁻³ day⁻¹, was obtained at an SRP concentration of 0.3 mg l⁻¹; higher concentrations did not increase fish yield. These levels of SRP and NFY were attainable with P fertilization rates of 0.2 g m⁻³ day⁻¹, 0.1 g m⁻³ day⁻¹ and 0.05 g m⁻³ day⁻¹ and N:P ratios of 2:1, 4:1, and 8:1 in ponds where the level of sediment P saturation was below 10%, above 45% and above 60%, respectively. Experiment 2 was conducted in earthen ponds to test and verify the P fertilization rate based on the cement tank results. Three new and three old ponds with 8 ± 1.7% and 88 ± 7.3% sediment P saturated in the top 5 cm of mud were fertilized at a rate of 0.2 g m⁻³ day⁻¹ and 0.05 g m⁻³ day⁻¹ and N:P ratio of 2:1 and 8:1, respectively. Nile tilapia were cultured at a density of two fish m⁻³ for 85 days. The mean NFY obtained in new and old ponds were 1.73 ± 0.08 g m⁻³ day⁻¹ and 2.24 ± 0.32 g m⁻³ day⁻¹, respectively, which were not significantly different (P>0.05). We conclude that P fertilization rate should be based on P saturation level in mud to overcome the problem of under or over supply of P in fish ponds.

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