PD - 10

Chemical budgets for intensive carp ponds

Lei Peng, Jae-Yoon Jo and Sung-Yong Oh
Department of Aquaculture, Pukyong National University

Introduction

Information on the fate of the added nutrients is essential for the assessment of the food utilization, pond fertility, water quality and processes in the sediment (Boyd, 1985). Also, they are useful for qualifying environmental impacts of aquaculture and for environmental management. The purpose of this experiment was to assess the fate of nitrogen and organic matter entering aquaculture ponds and the relative importance of the different resources.

Materials and methods

Two rectangular earthen ponds with concrete wall located in greenhouse were selected for this experiment. 2000 Israeli strain common carp fingerlings with an average weight of 6.3 g were stocked into each pond. Fish were fed 4-5 times a day and 7 days a week.

Results and discussion

Feed input contributed more than 90 percent of total nitrogen entering ponds. Fish growth accounted for approximately 40 percent of the total nitrogen input. Water exchange and seepage removed 15-17% of total nitrogen input. Another high loss of nitrogen is through draining, about 20-26% of total nitrogen input, mostly in inorganic nitrogen form, would loss through this way. Denitrification accounted for only 6-13% of total nitrogen input in our budgets. Feed input also represented most organic matter input into ponds and about 99% were via feed input. Fish harvest accounted for about 40% of the total organic matter input. Another 32% of total organic matter input was lost through fish respiration. WCR only accounted for 5-7% of total organic matter input. On dry matter basis, fish growth removed about 31% of total feed input, which means the left 69% of total feed input entering the ponds as metabolic waste.

Table 1. Inputs and their proportions (%) of nitrogen and organic matter (COD).

	Nitrogen				Organic matter (COD)			
	Pond A		Pond B		Pond A		Pond B	
Item	kg	%	kg	%	kg	%	kg	%
Input								
Feed	21.98	94.9	22.15	94.0	427.7	98.9	430.9	98.8
Fish stock	0.28	1.2	0.28	1.2	3.88	0.9	3.83	0.9
Initial filling	0.41	1.8	0.41	1.7	0		0	
Makeup water	0.48	2.1	0.72	3.1	0		0	
Photosynthesis					0.95	0.2	1.34	0.3
Fixation	0		0					
Total	23.15	100	23.6	100	432.53	100	436.1	100

Table 2. Outputs and their proportions (%) of nitrogen and organic matter (COD)

	Nitrogen				Organic matter (COD)			
	Pond A		Pond B		Pond A		Pond B	
Item	kg	%	kg	%	kg	%	kg	%
Output								
Fish harvest	9.14	39.5	9.39	39.9	174.5	40.3	175.4	40.2
Seepage	1.95	8.4	3.58	15.2	3.6	0.8	4.6	1
Water exchange	2.26	9.8	0	0	3.6	0.8	0	
Draining	4.62	20.0	6.11	25.9	5.4	1.3	5.9	1.3
WCR					32.3	7.5	24.3	5.6
Benthic respiration					?		?	
Fish respiration					141.3	32.7	141.3	32.4
Uptake by mud								
in pump chamber	0.82	3.5	2.51	11	20.6	4.8	54.8	12.6
adsorbed ammonia	0.46	2.0	0.4	1.7				
organic nitrogen	0.95	4.1						
Volatilization & denitrification	?		?					
Total	20.2	87.3	22	93.7	381.3	88.2	406.2	93.1
Unaccounted	2.95	12.7	1.57	6.3	51.2	11.8	29.9	6.9

References

Boyd, C.E., 1985. Chemical budgets for channel catfish ponds. Trans. Am. Fish. Soc. 114, 291-298.