

Table I. Biomass at fish stocking and harvest, and growth performances

Characteristic	Treatment Replicate	Extensive		Semi-intensive		Coupled	
		1	2	1	2	1	2
Biomass at fish stocking, (g)	Carp adult	20,421	21,027	42,407	40,766	41,395	42,489
	Roach adult	2,975	2,925	3,202	2,923	2,701	2,723
	Tench adult	102	80	55	81	39	107
	Total	23,498	24,032	45,664	43,770	44,135	45,319
	Density (kg.ha <sup>-1</sup> )	470	481	913	875	883	906
Biomass at harvest,(g)	Carp adult	27,285	25,107	191,716	186,092	171,504	165,427
	Roach adult	2,780	1,321	4,013	3,324	93	284
	Tench adult	347	258	1,466	1,437	531	931
	Carp fry		531	1,145	282	4,822	
	S1 roach fry	3,080	393	3,088	2,112	669	3,432
	S2 roach fry	288	6,045	356	1,335	63	20
	Total fry	3,368	6,969	4,589	3,729	5,554	3,452
	Total fish	33,780	33,655	201,784	194,582	177,682	170,004
	Percentage of fry in total fish biomass (%)	10.0	20.7	2.3	1.9	3.1	2.0
	Total fish density (kg.ha <sup>-1</sup> )	676	673	4036	3891	3,554	3,401
	Tadpole					2,135	54
	Crayfish	65				92	
	Total	33,845	33,655	201,784	194,582	179,909	170,058
Mean specific growth rate (%.day <sup>-1</sup> )	Carp adult	0.14	0.13	0.62	0.61	0.60	0.58
	Roach adult	0.02	-0.08	0.13	0.13	0.15	0.04
	Tench adult	0.82	0.80	1.34	1.14	1.13	0.87
Total net weight gain (kg)	Adult carp	6.86	4.08	149.31	145.33	130.11	122.94
	Total adult fish	6.91	2.66	151.53	147.08	127.99	121.32
	Total fry	3,368	6,969	4,589	3,729	5,554	3,452
	Total fish	10.28	9.62	156.12	150.81	133.55	124.77
	Percentage of fry in total net weight gain of fish (%)	32.8	72.4	2.9	2.5	4.2	2.8
	Productivity (kg.ha <sup>-1</sup> )	206	192	3,123	3,016	2,671	2,495
	Quantity of food supplied (kg)	0	0	275.9	275.9	275.9	275.9
Mean feed conversion ratio (kg.kg <sup>-1</sup> )	Carp <sup>1</sup>	-	-	1.85	1.90	2.12	2.24

<sup>1</sup>: fry not included.

Table II. Variation in water physico-chemical parameters in 24 hours recorded in September 2014

Characteristic	Treatment Replicate	Extensive		Semi-intensive		Coupled			
		1	2	1	2	Fish 1	Plant 1	Fish 2	Plant 2
Temperature (°C)	Minimum	19.9	19.9	20.3	20.5	-	19.7	19.9	19.4
	Mean	20.3	20.5	20.6	21.1	-	20.7	21.0	20.9
	Maximum	20.5	21.1	20.9	21.6	-	21.6	21.8	22.4
	$\Delta^1$	0.6	1.2	0.6	1.0	-	1.9	2.0	3.0
pH	Minimum	8.3	7.3	6.7	6.7	-	-	7.4	-
	Mean	8.5	7.4	6.8	7.0	-	-	7.4	-
	Maximum	8.7	7.6	6.8	7.2	-	-	7.5	-
	$\Delta^1$	0.4	0.3	0.2	0.5	-	-	0.1	-
ORP (mV)	Minimum	237	316	-396	285	-	-	583	-
	Mean	267	334	-385	297	-	-	608	-
	Maximum	283	346	-374	311	-	-	635	-
	$\Delta^1$	46	30	22	26	-	-	52	-
Conductivity (mS.cm <sup>-1</sup> )	Minimum	394	399	459	384	-	-	381	-
	Mean	402	400	524	385	-	-	381	-
	Maximum	409	403	554	388	-	-	382	-
	$\Delta^1$	15	4	95	4	-	-	1	-
O <sub>2</sub> (mg.l <sup>-1</sup> )	Minimum	2.5	2.3	-	4.9	-	2.2	4.7	1.5
	Mean	7.7	3.8	-	6.9	-	4.4	5.6	4.6
	Maximum	9.0	5.2	-	9.0	-	7.7	6.5	9.5
	$\Delta^1$	6.6	2.9	-	4.1	-	5.5	1.8	8.0
%O <sub>2</sub> (%)	Minimum	34	31	-	55	-	25	53	16
	Mean	106	52	-	78	-	50	64	53
	Maximum	124	72	-	103	-	88	76	111
	$\Delta^1$	91	41	-	48	-	63	23	94
TN (mg.l <sup>-1</sup> )	Minimum	1.52	1.00	5.27	3.55	2.63	2.12	2.39	2.30
	Mean	1.89	1.34	5.73	4.39	2.95	2.49	2.54	2.47
	Maximum	2.42	1.66	6.20	5.18	3.31	2.85	2.73	2.60
	$\Delta^1$	0.90	0.67	0.93	1.63	0.69	0.73	0.34	0.30
NH <sub>4</sub> <sup>+</sup> (mg.l <sup>-1</sup> )	Minimum	0.02	0.04	0.03	1.22	0.01	0.02	0.02	0.02
	Mean	0.45	0.37	0.05	1.38	0.08	0.14	0.02	0.03
	Maximum	0.70	0.66	0.15	1.59	0.68	0.54	0.03	0.07
	$\Delta^1$	0.68	0.62	0.13	0.37	0.67	0.51	0.01	0.05
NO <sub>3</sub> <sup>-</sup> (mg.l <sup>-1</sup> )	Minimum	0.01	0.05	2.36	0.79	0.32	0.56	1.42	1.23
	Mean	0.22	0.35	2.57	0.82	1.09	1.13	1.49	1.33
	Maximum	0.84	0.55	2.72	0.92	1.21	1.54	1.59	1.46
	$\Delta^1$	0.83	0.50	0.37	0.13	0.88	0.98	0.17	0.23
PO <sub>4</sub> <sup>3-</sup> (mg.l <sup>-1</sup> )	Minimum	0.01	0.00	0.06	0.03	0.03	0.02	0.00	0.00
	Mean	0.04	0.02	0.10	0.04	0.04	0.03	0.01	0.00
	Maximum	0.07	0.07	0.13	0.06	0.05	0.04	0.02	0.01
	$\Delta^1$	0.06	0.07	0.07	0.04	0.02	0.02	0.02	0.01
TP (mg.l <sup>-1</sup> )	Minimum	0.06	0.07	0.06	0.08	0.03	0.02	0.06	0.01
	Mean	0.10	0.12	0.10	0.21	0.04	0.03	0.10	0.05
	Maximum	0.19	0.16	0.13	0.40	0.05	0.04	0.14	0.09
	$\Delta^1$	0.13	0.08	0.07	0.32	0.02	0.02	0.09	0.08

<sup>1</sup>:  $\Delta$  is the difference between minimum and maximum values.

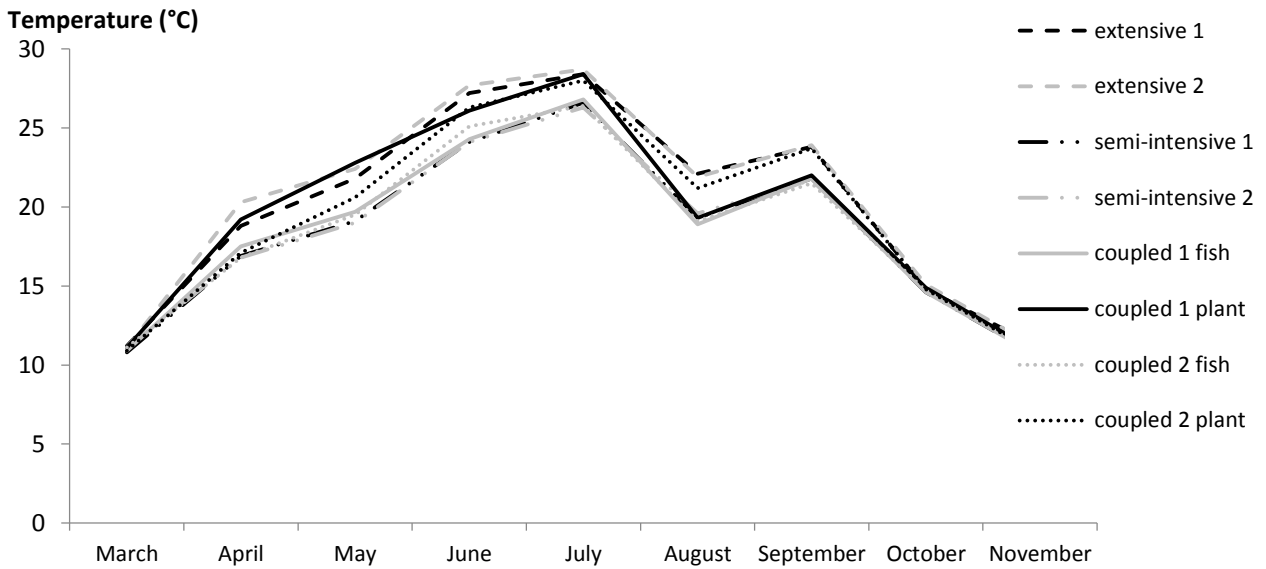


Figure I. Water temperature dynamics during the rearing period in two replicates of carp polyculture ponds: extensive (without formulated feed), semi-intensive (with feed and double fish density), and coupled (semi-intensive (fish) + planted lagoon (plant))

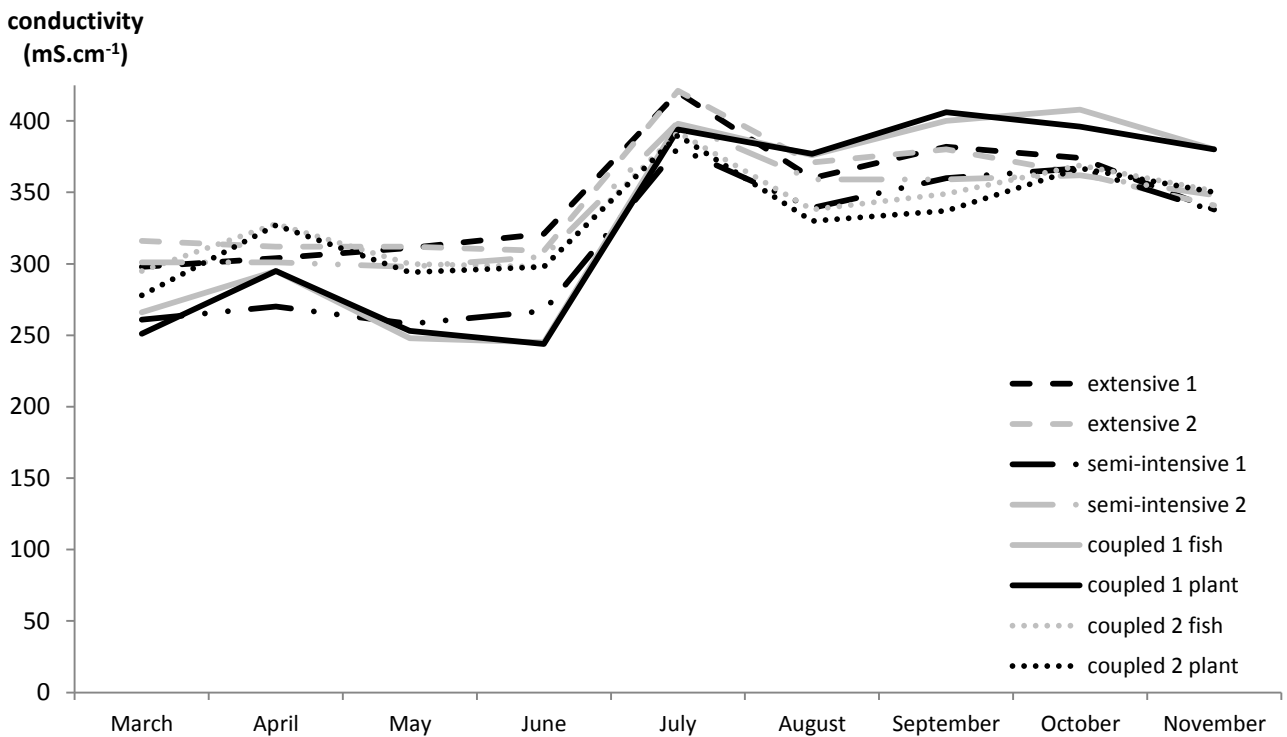


Figure II. Water conductivity dynamics during the rearing period in two replicates of carp polyculture ponds: extensive (without formulated feed), semi-intensive (with feed and double fish density), and coupled (semi-intensive (fish) + planted lagoon (plant))

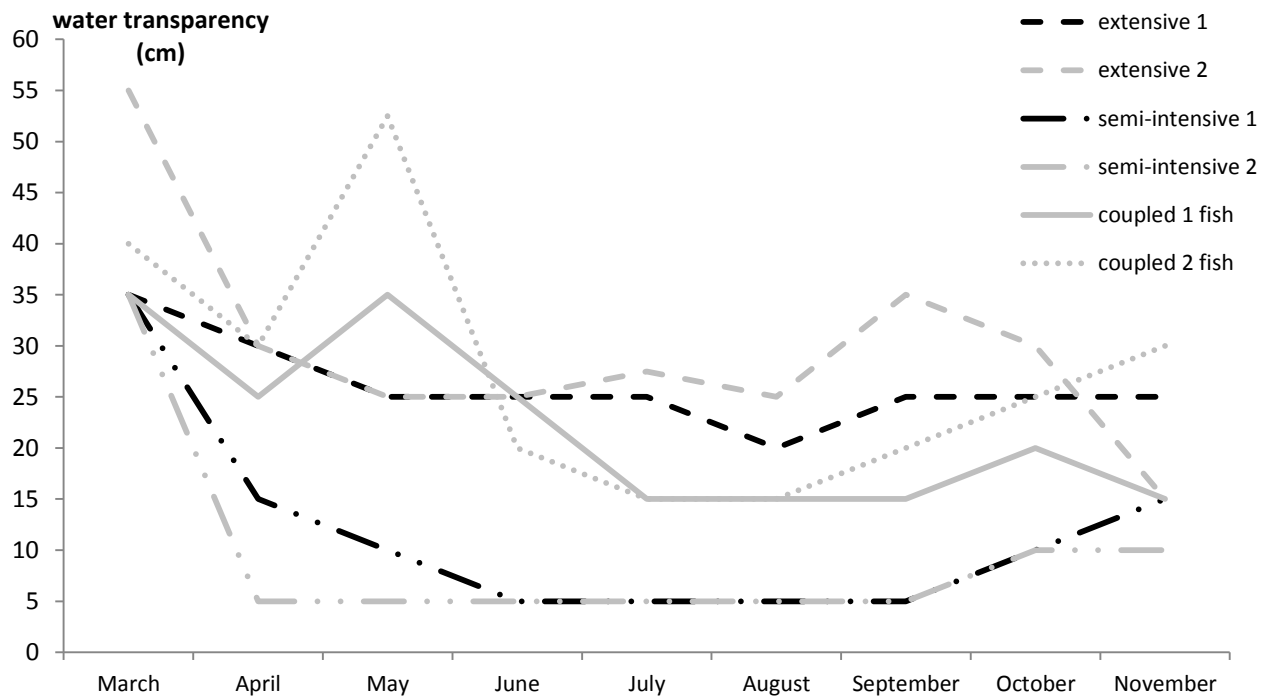


Figure III. Water transparency dynamics measured with a Secchi disk during the rearing period in two replicates of carp polyculture fishponds: extensive (without formulated feed), semi-intensive (with feed and double fish density), and coupled (semi-intensive (fish) + planted lagoon (plant))



Figure IV. Water temperature measured at a depth of 50 cm every 5 minutes for 24 hours in September 2014 in pond 2 of each treatment



Figure V. Water Dissolved Oxygen (DO) measured at a depth of 50 cm every 5 minutes for 24 hours in September 2014 in pond 2 of each treatment