



**JICA-MALAWI PROJECT**  
**"AQUACULTURE RESEARCH AND TECHNICAL DEVELOPMENT**  
**OF**  
**MALAWIAN INDIGENOUS SPECIES"**  
**The 3rd Joint Coordinating Committee Meeting (October 10, 2001)**

**Activity Report of Seed Production Division from April 1999 to August 2001**  
**JICA Expert FUTAGAWA Masatoshi**

1. Broodstock

1.1 Collection

The total of 977 broodstock were collected from April 1999 to August 2001 (Table 1). These were purchased from fishermen or fishing by the project at Salima and Liwonde.

**Table 1. Broodstock Collection Summary by Species**  
**From April 1999 to August 2001**

Species	Total		Male		Female		Unknown	
	ind.	Kg	ind.	Kg	ind.	Kg	ind.	Kg
Kadyakolo	70	16.17	15	2.47	22	5.01	33	8.70
Nkhoti	4	2.00	0	0.00	0	0.00	4	2.00
Mpasa	390	66.35	166	25.87	176	30.77	48	9.70
Mphuta	3	0.28	0	0.00	0	0.00	3	0.28
Ngumbo	96	24.71	15	3.59	37	7.64	49	13.49
Ningwi	162	37.92	17	2.84	35	9.96	111	25.11
Ntchila	222	54.49	30	6.01	17	4.01	175	44.47
Thamba	30	6.43	9	1.44	6	1.80	15	3.20
<b>Total</b>	<b>977</b>	<b>208.35</b>	<b>252</b>	<b>42.21</b>	<b>293</b>	<b>59.19</b>	<b>438</b>	<b>106.95</b>



1.2 Rearing

The collected broodstock are rearing at earth pond. These are acclimatized pond condition and accepted artificial feeds (pellet feeds). The project has developed three formulations of compound feeds (Table 2).

Table 2. Compound Feed Production

Date: 05-Sep-01

Ingredients	Adult		Fingerling		Fry	
	%	Kg	%	Kg	%	Kg
Fish meal	20.0	0.0	32.5	10.0	52.5	20.0
Meat & bone meal	15.0	0.0	15.0	4.6	12.5	4.8
blood meal	5.0	0.0	5.0	1.5	0.0	0.0
soybean meal	23.5	0.0	15.0	4.6	0.0	0.0
Wheat flour	23.0	0.0	22.0	6.8	25.0	9.5
Maize bran	13.5	0.0	10.5	3.2	0.0	0.0
Milk powder	0.0	0.0	0.0	0.0	10.0	3.8
Vitamin mix	0.0	0.0	0.0	0.0	0.0	0.0
Mineral mix	0.0	0.0	0.0	0.0	0.0	0.0
Ingredients Total	100.0	0.0	100.0	30.8	100.0	38.1
Pellet powder		0.0		6.0		0.0
Water	20.0	0.0	20.0	7.4	20.0	7.6
Total Weight		0.0		44.1		45.7



The water parameter (DO, pH and water temperature) is measuring every morning by taking water from bottom of pond (Fig. 1).

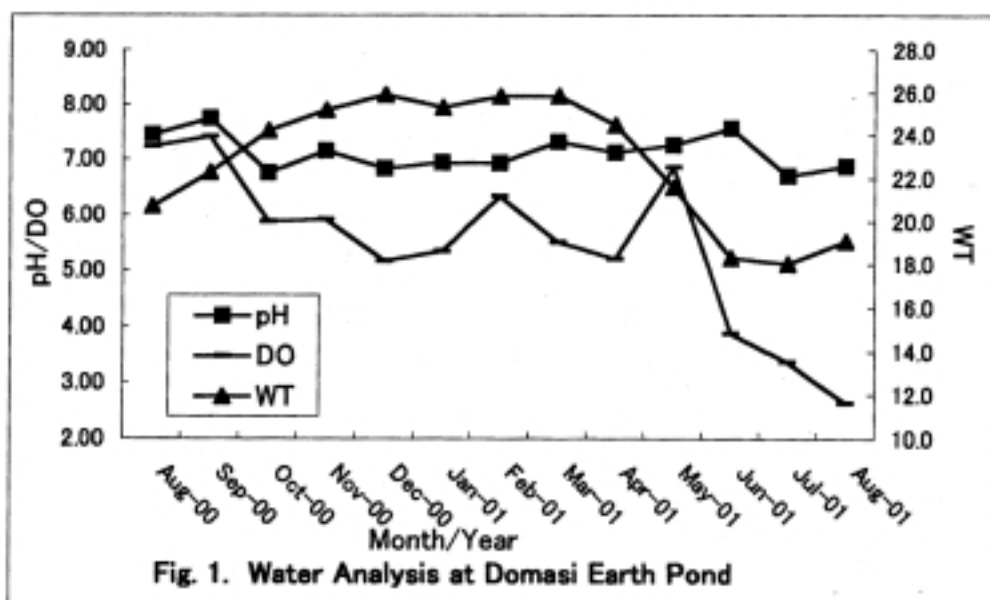


Fig. 1. Water Analysis at Domasi Earth Pond

## 2. Fry production

### 2.1 Egg and Hatch-out fry

Table 3 is showing the number of collected eggs and hatch-out fry of 5 species by hormone injection method.

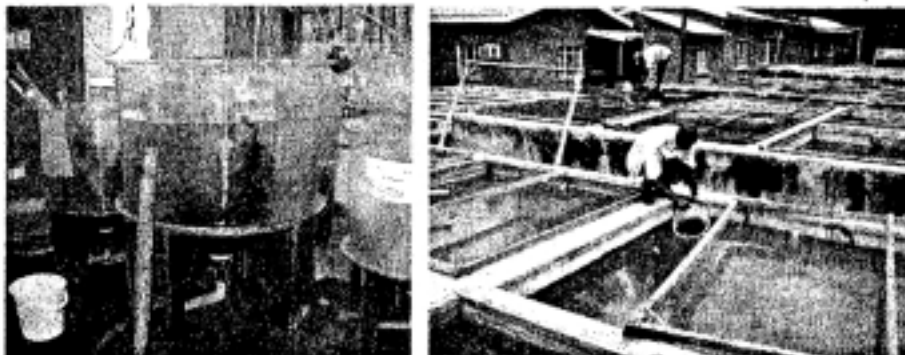
**Table 3. Spawning, Hatch-out and Survival Record  
April, 1999 to August, 2001**

unit: X1,000

Species	Origin of broodstock	Spawning, Hatch-out and Survival Record		
		Spawned Egg	Hatch-out Fry	Batch
Mlamba	EP19, 23	228.8	159.5	13 to 16
Mpasa	Wild, EP13	35.2	19.7	04 & 05
Ningwi	Wild, EP14	378.0	236.6	02 to 05
Ntchila	Wild, Batch1,2, EP14	53.9	30.0	04 to 06
Thamba	Wild, EP13,25	473.4	309.4	02 to 04
Total		1,169.3	755.2	

### 2.2 Fry Rearing

At first, the broodstock spawned inside the spawning tank, then the eggs were transferred to hatch-out tank. When the eggs hatched, hatch-out fry are distributed to fry rearing tanks at 5fry/L density. The fry were reared in 0.5 to one ton tank inside hatchery until 60 days old. Then fry were transferred to 5 ton to 50-ton concrete tank outdoors until it grows to fingerling size.



### 2.3 Fry Production

Mlamba fry was reared with high survival rate and high rearing density (10 ind/L) at 28 days old to feed high concentration (10 ind/ml) of zooplankton (Copepoda, Daphnia, Rotifer).

The Mpasa is very sensitive fish about water quality. The 4<sup>th</sup> batch was dead totally until 84days old due to white spot disease.

The Ningwi and Thamba have high fecundity and Ningwi, Ntchila and Thamba are easy to rear.

Fry production results are given in Table 4.

Table 4. Fry Production Result  
April 1999 to August 2001

Species/ Batch	Tank	Stock Date	Fry	ind/L	DAO	Transfer		Remarks
						Fry	SR(%)	
Miamba13	CN05	07-Dec-00	4,000	10	30	808	20.2	
Miamba14	CN02	10-Dec-00	4,000	10	28	1,087	27.2	Mass mortality
Miamba14	CN03	10-Dec-00	4,000	10	28	2,306	57.7	
Miamba14	CN04	10-Dec-00	4,000	10	28	3,198	80.0	
Miamba16	CN01	07-Feb-01	4,000	10	32	11	0.3	by C/P
Miamba16	CN02	07-Feb-01	4,000	10	32	11	0.3	by C/P
Miamba16	CN03	09-Feb-01	4,000	10	32	14	0.4	by C/P
Mpasa03	CN11	17-Jul-00	14,200	71	26	1,458	10.3	
Mpasa04	CN02	13-Apr-01	4,499	11	38	1,789	39.8	
Ningwi02	CN7	08-Feb-01	4,000	10	42	1,681	42.0	
Ningwi03	CA1	22-Feb-01	4,000	10	31	2,872	71.8	
Ningwi04	CN05	03-Mar-01	21,100	53	46	5,099	24.2	
Ningwi05	CN03	07-Mar-01	23,200	58	56	6,304	27.2	
Ntchila04	CN04	23-Jan-01	2,736	7	42	1,681	61.4	
Ntchila05	?	15-Feb-01	Throw out due to few fry					
Ntchila06	RT3	03-Mar-01	2,500	3	30	1,625	65.0	
Thamba02	CN01	04-Dec-00	40,000	100	52	34	0.1	
Thamba03	CN06	19-Jan-01	Mass mortality due to no water supply					
Thamba04	RT4	19-Feb-01	2,500	3	44	573	22.9	

### 3. Grow-out experiment

We are conducting some rearing experiments of fingerling to determine ideal rearing technique like rearing density, feeding rate and so on. The details are as follows.

- 3.1 The growth of Ningwi fingerling in earth pond with feeding at Domasi and Kasinthula (RE01). The Daily Weight Gain (DWG) shows 1.1 to 1.5% and growth is not so good. There is no difference between Domasi and Kasinthula.
- 3.2 The growth of Ningwi fingerling at earth pond without feeding (RE02). The experiment spent more than 5 months and the growth is slow.
- 3.3 The growth of Ningwi, Ntchila and Thamba at earth pond with feeding (RE03). We are selected good gene, which grow fast, and chose big one from same batch. The growth of three species showed unsatisfactory.
- 3.4 The growth of Ningwi and Ntchila mix with tilapia polyculture (RE04). We mixed Ningwi and Ntchila in tilapia grow-out pond. The Ntchila showed better growth than Ningwi and we found it hard to catch Ningwi recently. The Ningwi may have low survival.
- 3.5 The relation between rearing density and growth with Ningwi (RE05). The result showed that the density of Ningwi dose not affect growth in 500ind/ton density at body weight 0.9g.
- 3.6 The growth of Ningwi fingerling at earth pond with feeding (RE06). This experiment failed due to predation of fingerling by birds.
- 3.7 The growth of Ntchila fingerling at earth pond with feeding (RE07). We like to

**RESULTS 2**  
(Other species)

No.	1-a		1-b		1-c		2-a		2-b		3-a		3-c	
Species	Shiranus	Shiranus	Shiranus	Cylindricus	Shiranus	Rendalli	Shiranus	Rendalli	Shiranus	Rendalli	Shiranus	Rendalli	Shiranus	Rendalli
Name of farmers	Chinseu SS	Chinseu SS	Chinseu SS	Chisitu SS	Chinseu SS	Chinseu SS	Chinseu SS	Chinseu SS	Chinseu SS	Chinseu SS	Chisitu SS	Chisitu SS	Chisitu SS	Chisitu SS
Area (m <sup>2</sup> )	256	368	400		384	260	600							
Treatment	feed only	manure only	Feed only		Nothing	Nothing	Feed only				Feed only	Feed only		
Duration of Trial	Aug00-Mar01	Aug00-Mar01	Feb00-Sep01		Aug00-Mar01	Aug00-Mar01	Sep00-Mar01				Sep00-Mar01	Sep00-Mar01		
Days	213	213	225		213	213	167				167	167		
Water temperature (°C)	21-30	22-31	17-28		22-31	22-33	-				-	-		
A	Initial No. stocked	825	1198	1480		724	2070			438	2070	2077		
B	No. at harvest	702	772	935		503	381			152	381	291		
B/A	Yield rate (%)	85.1	64.4	63.2		69.4	17.4			34.8	17.4	14.2		
C	Initial total weight (kg)	7.4	10.8	11.1		6.5	11.2			3.5	11.2	24.5		
D	Final total weight (kg)	23.6	23.1	25.8		10.4	21.8			3	21.8	12.8		
D/C	Rate of weight gain (%)	318.9	213.9	232.4		160	194.6			85.7	194.6	52.2		
E	Initial Av bwt size (g)	9	9	7.5		9	5.4			8	5.4	11.8		
F	Final Av bwt size (g)	33.5	29.9	27.6		20.7	57.1			19.7	57.1	34.4		
F/E	Rate of individual wt gain (%)	372.2	332.2	368		230	1057.4			246.3	1057.4	291.5		
G	Stocking density (No./m <sup>2</sup> )	3.2	3.3	3.7		1.9	3.5			1.7	3.5	3.5		
H	No. harvest/m <sup>2</sup>	2.7	2.1	2.3		1.3	0.6			0.6	0.6	0.5		
I	Stocking weight (total)/m <sup>2</sup> (g)	28.9	29.3	27.8		16.9	18.7			13.5	18.7	40.8		
J	Harvested total weight/m <sup>2</sup> (g)	92.2	62.8	64.5		27.1	36.3			11.5	36.3	21.3		
K	Total feed weight (kg)	408	0	563		0	176			0	176	182		
D-C/K	Feed conversion rate (%)	4	-	2.6		-	-			-	-	-		
Remarks														
Fry Production No.	5564	8440	10			220	461				180	247		
Av. Weight of fry produced (g)	3.7-5.9	3.7-5.7	-			3.5-8.8	4.3-4.4				12	14.3		

No	B	9	10	11	12	13	14
Name of farmers	Chidothi W.G	Chidothi W.G	Chidothi W.G	Chidothi W.G	Chidothi W.G	Chidothi W.G	Malemusi
Area (m <sup>2</sup> )	221	124	171	113	190	160	180
Treatment	manure&feed Sep00-Apr01	manure&feed Sep00-Apr01	manure&feed Sep00-Apr01	manure&feed Sep00-Apr01	manure&feed Sep00-Apr01	manure&feed Sep00-Apr01	feed only Sep00-Apr01
Duration of Trial	182	182	176	203	203	203	221
Days	24-31	24-31	24-31	24-32	24-32	24-32	23-31
Water temperature (°C)							
A Initial No. stocked	1120	609	995	641	969	812	1288
B No. at harvest	720	170	322	166	355	241	157
B/A Yield rate (%)	64.2	27.9	32.4	25.9	36.6	29.7	12.2
C Initial total weight (kg)	10.8	5.8	16	9.6	19.4	12.2	19.3
D Final total weight (kg)	18.7	5.5	9.8	4.5	14.9	9.1	5.4
D/C Rate of weight gain (%)	173.2	94.8	61.3	46.9	76.8	74.6	28
E Initial Av bwt size (g)	9.6	9.6	16.1	15	20	15	15
F Final Av bwt size (g)	26	32.4	30.3	27.1	42	37.6	34.4
F/E Rate of individual wt gain (%)	270.8	337.5	188.2	180.2	210	250.7	229.3
G Stocking density (No./ m <sup>2</sup> )	5.1	4.9	5.8	5.8	5.1	5.1	7.2
H No. harvest/m <sup>2</sup> (No./m <sup>2</sup> )	3.3	1.4	1.9	1.5	1.9	1.5	0.8
I Stocking weight/(total)/ m <sup>2</sup> (g)	48.9	46.8	93.6	85	102.1	76.8	107.2
J Harvested total weight/m <sup>2</sup> (g)	84.5	44.4	57.3	39.8	78.4	56.9	30
K Total feed weight (kg)	50	50	50	58	58	58	210
D-C/K Feed conversion rate (%)							
Remarks		pond was flooded	pond was flooded	pond was flooded	pond was flooded	pond was flooded	dyke was broken due to flooding
Fry Production No.	1513	422	591	777	1039	1039	715
Av. Weight of fry produced (g)	5.4-11.6	4.8	2.9-14.3	4.1-11.8	4.8-16.1	4.8-16.1	7.2