A Report of
Paddy Culture Experiment I

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Contents

1. Introduction

Resently a technique of grass carp (Ctenopharyngodon idellus) fry production has been established at Nandruloulou Aquaculture Station. All of the fry produced at this station are released to control weed growth in rivers and paticularly irrigation cannals, however, size of the fry which are released at present is not large enough to get rid of weeds effectively. The fry should be raised for a couple of months more before being released, but it is impossible to do so now because of un insufficient number of pond and other management concerns at the station.

In order to raise fry to a larger size, we could consider the possibility of using paddis. While fry are increasing their weight in rice fields, we could expect them to graze on weeds and clean paddis at the same time. Furthermore, we could utilize the paddis to raise tilapia and grass carp.

The purpose of this experiment is to know the effect grass carp have on weedkilling and the growth rate of grass carp and tilapia in paddis.

2. Methods

Paddis :
Two paddis were made at NP13 and NP12 in Nandruloulou Aquaculture Station. One, A, was 303.6m^2 in area and the other, B, was 291.6m^2 in area. Both paddis were surrounded by a ditch and had a central drain connecting the inlet to the outlet.(Fig. 1.)

Sowing of rice :

Rice seed was sowed in paddis on 27th July 1991. We used a seeder to sow seed in lines and increased the water level after 40 days.

Fish :

Three houndred grass carp fry and 100 tilapia fry were brought to the paddis from other ponds in the station. They were measured for body weight and body length and then 200 grass carp were released to paddy A and 100 grass carp and 100 tilapia released to paddy B.

Grass carp in paddy A weighed 75.6g in average body weight and scaled 14.9cm in average body length (scale length). Grass carp in paddy B weighed 86.3g and scaled 15.7cm in average. Tilapia in paddy B weighed 9.0g and scaled 6.5cm in average. The number of fish in both paddis were counted and weighed when they were harvested.

Feed :

Grass carp and tilapia were not fed artificially.

Periods :

The period of experimentation was from July 27,1991 to December 6,1991. Grass carp and tilapia fry were released into paddis on September 13, 1991, grass carp in paddy A were harvested on November 15,1991 and both grass carp and tilapia in paddy B harvested on November 13,1991. Rearing periods were 62 days for paddy A and 64 days for paddy B. We measured each fish for body weight and body length after harvest. Water temperatures during the experiment ranged from 22.2 ℃ to 31.3 ℃ in paddy A and 21.9 ℃ from 28.5 ℃ in paddy B(Fig.2.).

Harvest of rice

Rice was harvested on December 6,1991. After a growing period of 133 days.

3. Results

After 61 days of the experiment, grass carp and tilapia grew up rapidly. We harvested about 35.8kg of grass carp from paddy A, about 22.8 kg of grass carp and 2.7kg of tilapia from paddy B. The avarage body weight of grass carp in paddy A increased from 75.6g on September 13 to 187.6g by November 15, in paddy B increased from 83.6g to 250.1g, while tilapia increased from 9.0g to 46.2g by November 13(Fig.9.). The average body weight and body length (scale length) and condition factor are shown in Table 1. The growth of the grass carp in paddy B was faster than in paddy A (Table 1.).

Table 1. Body weight, body length and condition factor for grass carp and tilapia.

	Paddy A	Paddy B	
	Grass carp	Grass carp	Tilapia
Initial B.W.	75.6g	83.6g	9.0g
Final B.W.	187.6g	250.1g	46.2g
Initial B.L.	14.9cm	15.7cm	6.5cm
Final B.L.	21.0cm	22.4cm	10.7cm
Condition Factor Initial	2.29	2.16	3.28
Condition Factor Final	2.03	2.23	3.77

The frequency distribution are shown in Fig.3,5 and 7. The relationship between B.L. and B.W. are shown in Fig. 4,6 and 8. Condition factor, as shown in Table 1., increased on grass carp in paddy B and tilapia.

The survival rate of grass carp through the experimental period was slightly higher in paddy A, but in both samples was above 90%. The survival rate of tilapia was considerably lower, at as shown in Table 2.

Table 2. Number of fry and survaival rate for grass carp and tilapia

	paddy A	paddy B	
	Grass carp	Grass carp	Tilapia
Initial No. of fry	200	100	100
Final No. of fry	191	91	58
Survaival Rate	95.5%	91.0%	58.0%

The stocking density (g/m^2) of grass carp in paddy A increase from $49.8g/m^2$ to $118.0g/m^2$ and paddy B increased from $28.7g/m^2$ to $78.0g/m^2$. The weight gain per m^2 was, therefore, considerably higher in paddy B, as shown in Table 3.

Table 3. Stocking density and weight gain for grass carp and tilapia

	paddy A	paddy B	
	Grass carp	Grass carp	Tilapia
Stocking Density Initial	$49.8g/m^2$	$28.7g/m^2$	$3.1g/m^2$
Stocking Density Final	$118.0g/m^2$	$78.0g/m^2$	$9.2g/m^2$
Weight Gain	136.9%	171.8%	196.8%

One houndred two and half kg of rice was harvested from paddy A and 135.2 kg of rice harvested from paddy B unhulled rice.

4. Discussion

The growth of grass carp in paddy A was lower than in paddy B. The difference between the two groups was considered to be mainly due to the difference in stocking densities, since both paddies were otherwise under similar conditions. In this case we did not consider the relation between Grass carp and tilapia, as the food habits of grass carp and tilapia are completely different.

There seemed to be more competition between grass carp for food in paddy A than in paddy B. Therefore, these results could indicate that the growth rate of grass carp depends on the amount of weeds which is available in a paddy. The optium number of fish in a paddy should be determined in order to make maximum use of weed during further experiments.

The reason we released Tilapia with grass carp in paddy B is to examine the possibility of polyculture in paddies. The unexpected increase of by on grass carp and tilapia in paddy B seemed to be due not only to a lower density of grass carp but also to different food habits between grass carp and tilapia. As a result, we can expect a better use of the total environment, not only of weed but also of insects in a paddy, when tilapia and grass carp are raised together in it.

The low survival rate of tilapia could be partially attributed to our missing the harvest of some of the tilapia because of their habit if hiding in the mud. As an alternative method, we could drain the paddy slowly to harvest the tilapia. This method could prevent tilapia from running away and could produce more accurate survival rate.

In conclusion, the present experiment has demonstrated that grass carp grow well and help to decrease the amount of weeds in paddis. This can reduce the task of weeding paddies. However,further study is needed to elucidate a appropriate stocking density.

5. Acknowlegement

We would like to express our sincere thanks to Mr.Tomoe Sato, JICA expert on agriculture extention and Mr.Ikuo Yamamoto, JICA expert on agricultural machinery both from Koronevia Reserch Station, MPI, for kind advice on rice culture and providing machines for the experiment.

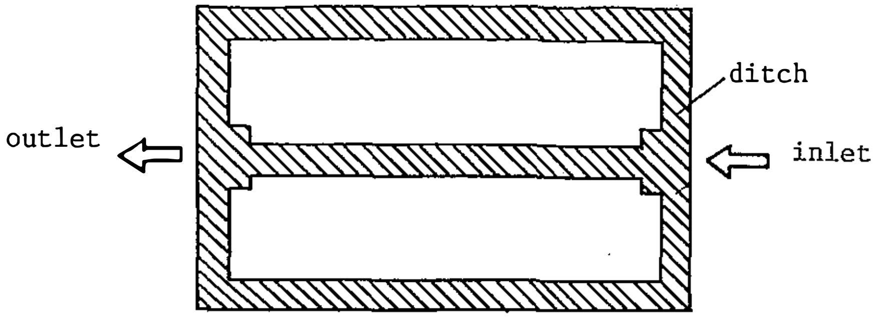

Fig. 1. A plot of ditch.

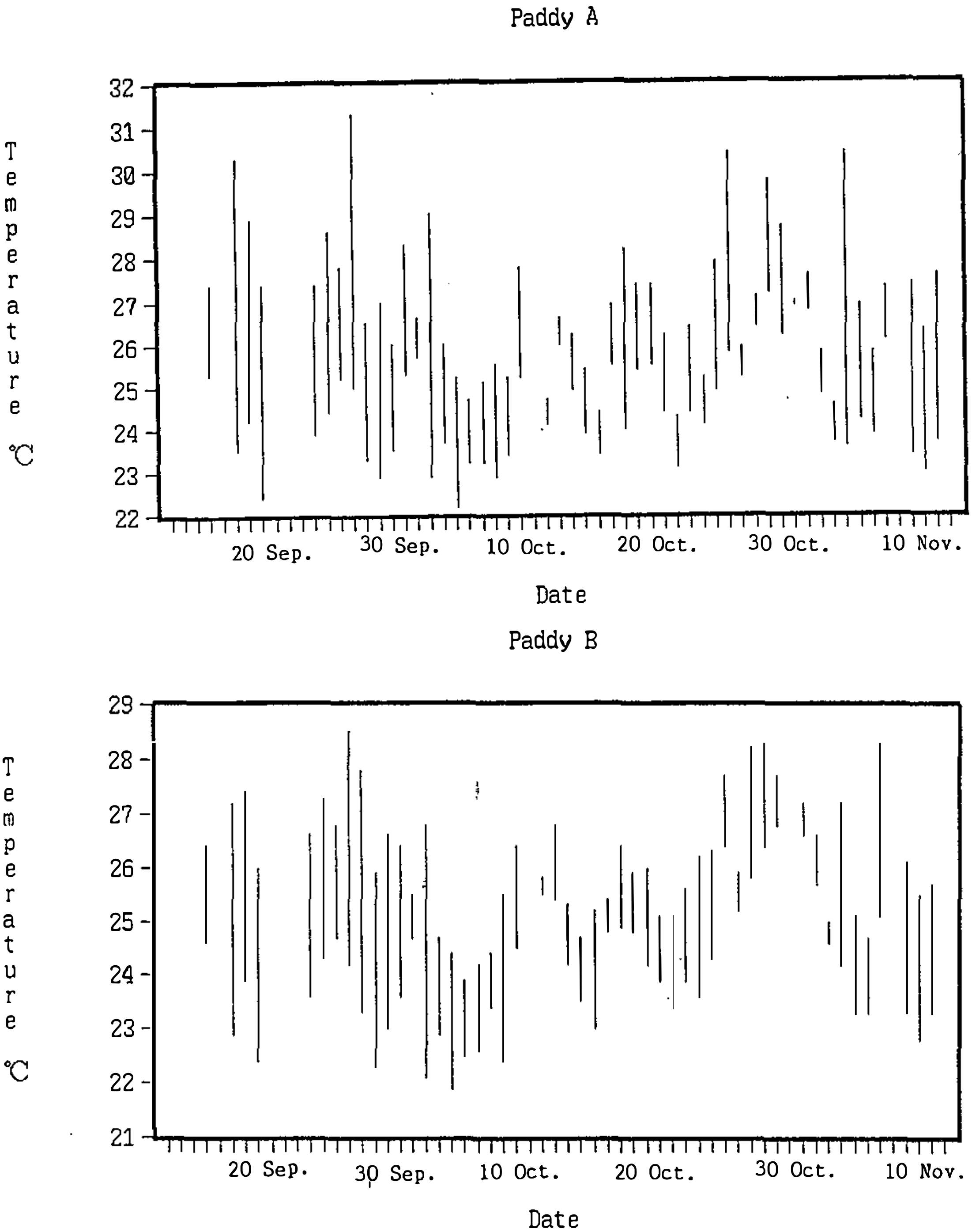

Fig. 2. Daily changes in maximu and minimum water temperature at 0800h and 1500h in Paddy A and B. Bars indicate the range of the temperature.

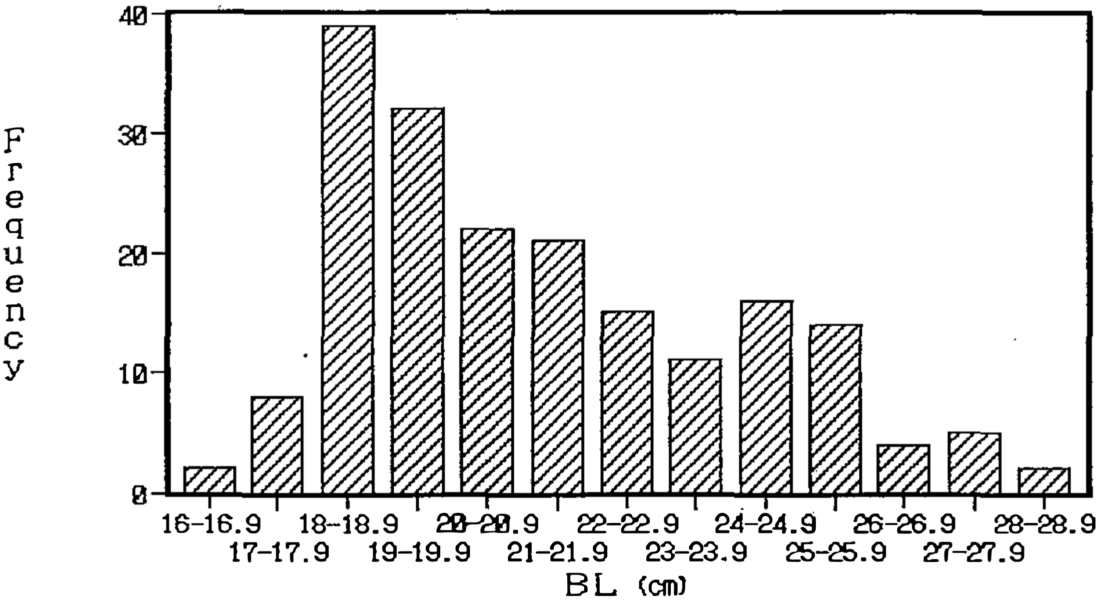

Fig. 3. Frequency distribution of body length (scale length) of grass carp in Paddy A.

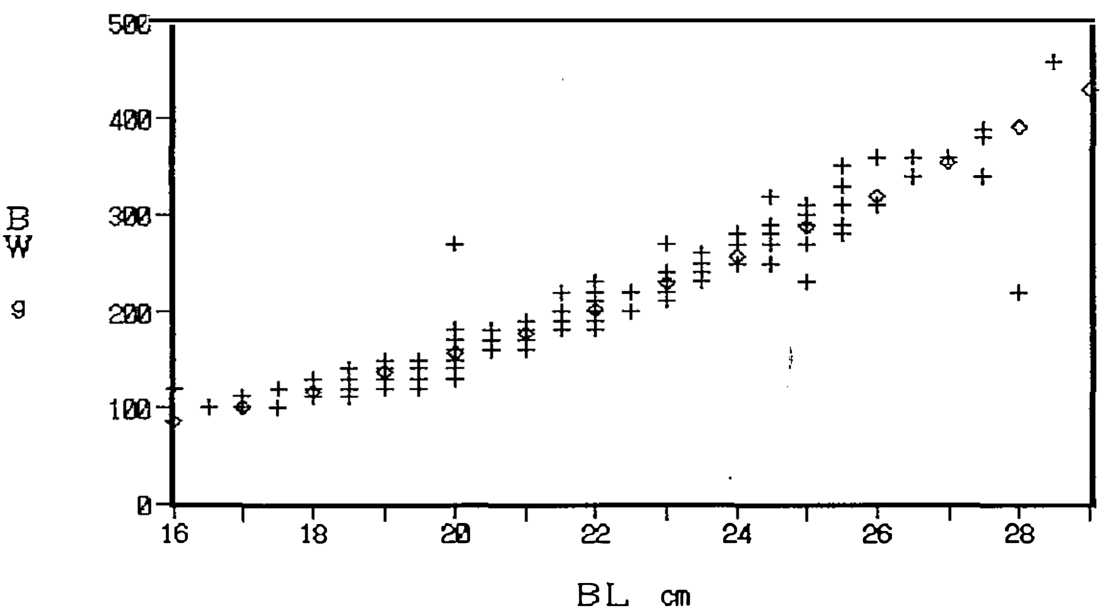

Fig. 4. Relationship between body length (scale length) and body weight of grass carp in Paddy A.

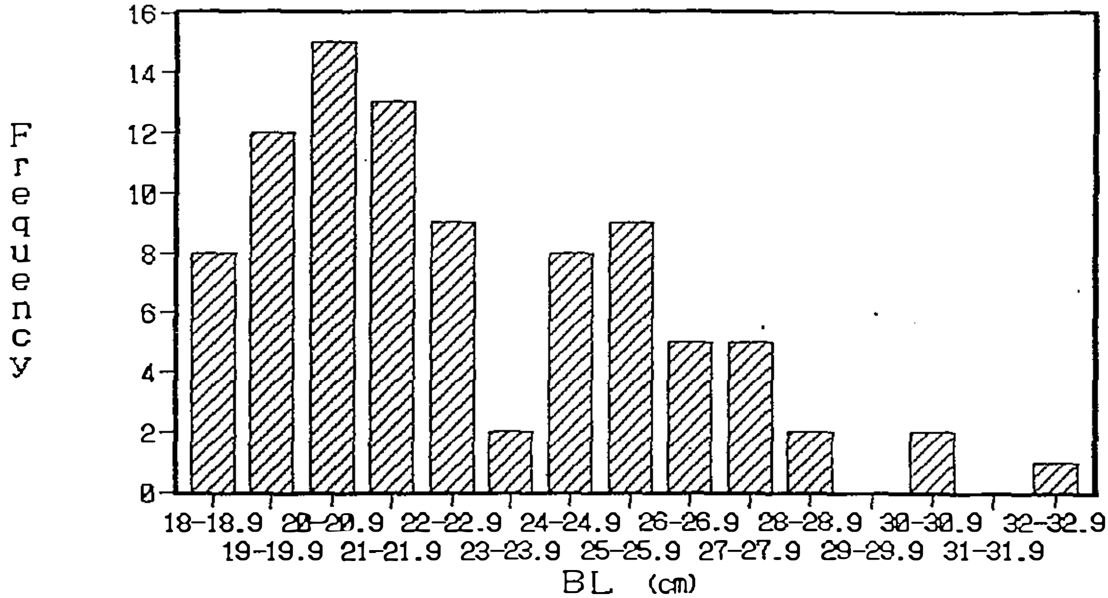

Fig. 5. Frequency distribution of body length (scale length) of grass carp in Paddy B.

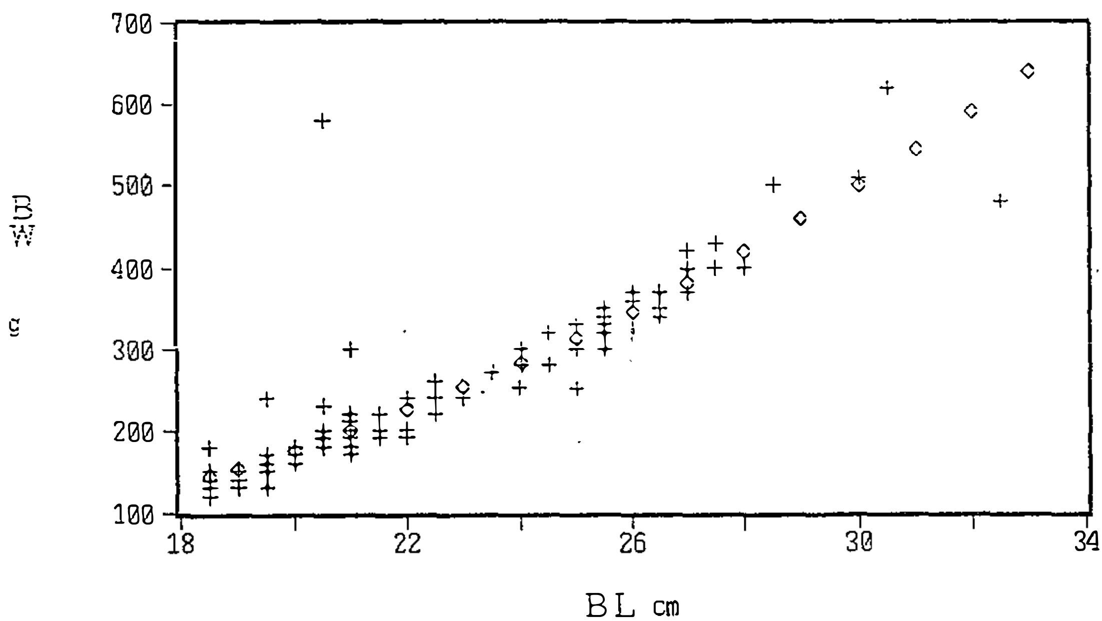

Fig. 6. Relationship between body length (scale length) and body weigth of grass carp in Paddy B.

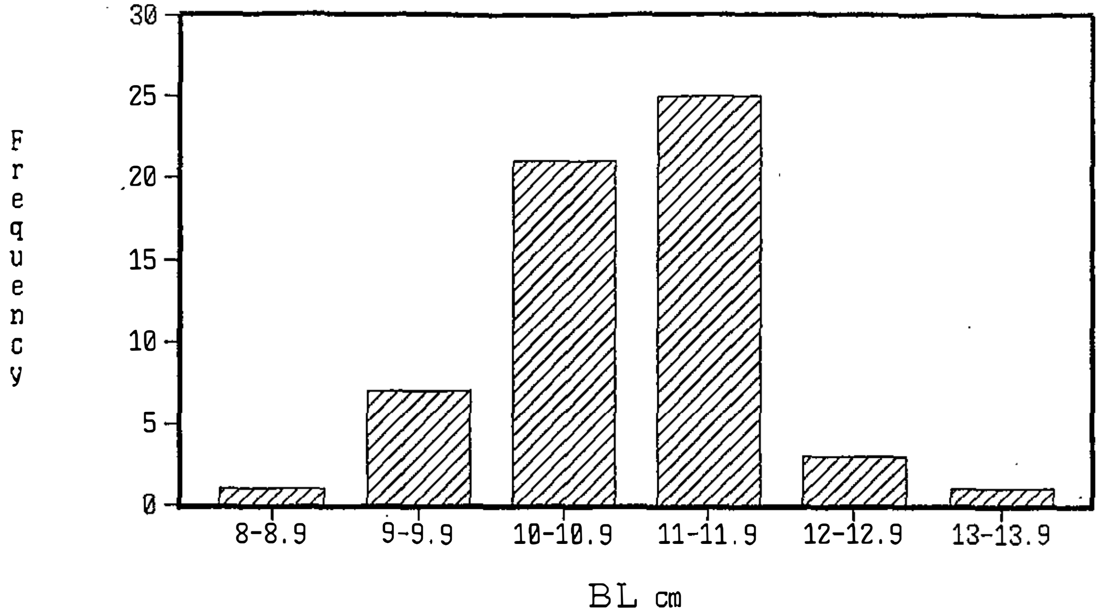

Fig. 7. Frequency distribution of body length (scale length) of tilapia in Paddy B.

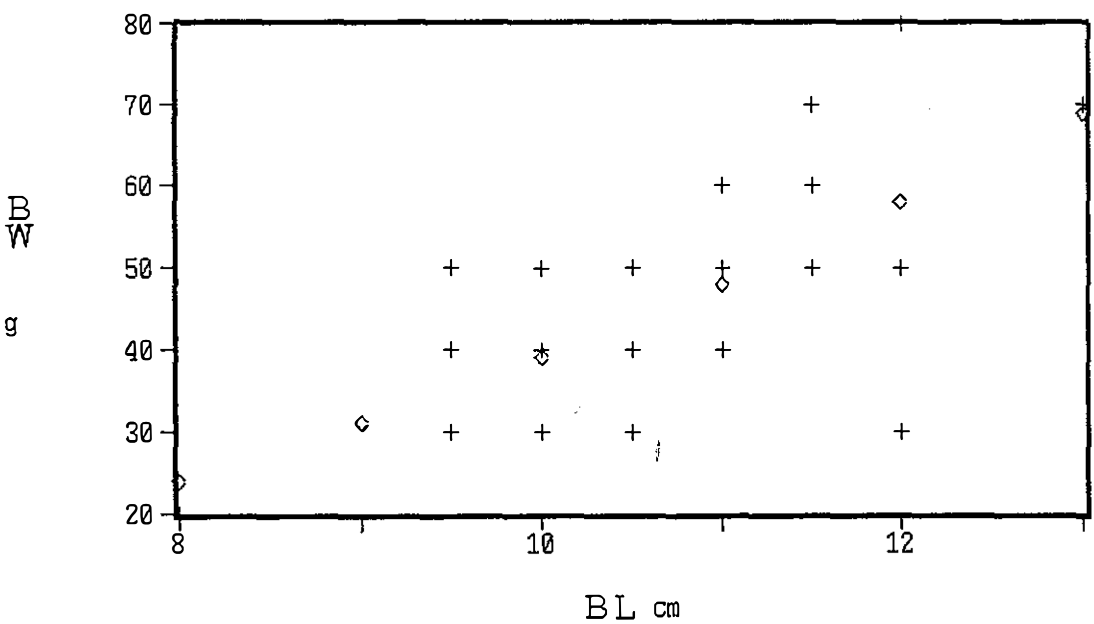

Fig. 8. Relationship between body length (scale length) and body weight of tilapia in Paddy B.

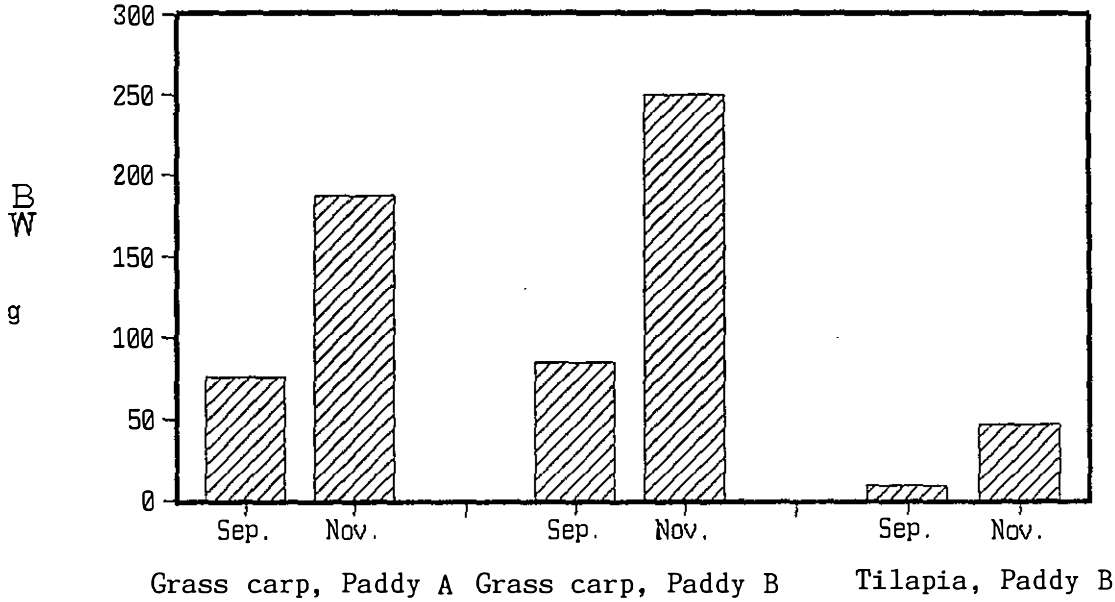

Fig. 9. Comparison between initial B.W. and final B.W.