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ABSTRACT

The study was conducted with the primary objective of comparing the effects of natural food, and artificial feeds on the growth of carp in terms of their weight.

Data were gathered using portable equipment such as the pH meter, DO meter, and top loading balance. The carps were fed everyday and were weighed once a week. Carps on aquariums A1 and A2 were given the natural food, ***Hydrocharitaceae verticillata***, while the carps on B1 and B2 were given fishmeal, the artificial feed.

The experiment yielded the average weights of 5.25 grams for Aquarium A, and 5.65 grams for Aquarium B.

By these results, we concluded that there is no significant difference between natural and artificial feeds as food for ***Cyprinus carpio*** in terms of weight.

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CHAPTER I
INTRODUCTION

A. RATIONALE OF THE STUDY

Fish were among the first animals systematically hunted by primitive humans. Even today, relative primitive societies in the South Pacific and South America depend largely on fish for food; while in many industrialized nations, fish still constitute a major part of the diet. Today, fishes are still harvested for unprocessed human food, fish meal, animal feeds and oil. They are also pursued avidly by sport anglers, who contribute to the economy of fishing areas and to specific industries. Currently however, the increasing human population, the pollution of the world's waters are all cutting heavily on the world's supply of fish, and threatening the existence of a number of species. At the same time, regulations to the curtail of some species or sizes are virtually unreforceable on an international level (Grolier, 1991).

Since the Philippines is surrounded by a vast bodies of water, fish are one of its richest resources. For so many reasons, fish are very important to people, especially to the Filipinos because they constitute a major part of the Filipino's daily consumption. One of the most common fishes used and needed by the Filipinos are the carps.

Carp, scientifically known as ***Cyprinus carpio*** ,was chosen because of its availability and economic importance. They will be the only

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dependent variable of the thesis. This species is the principal farmed cyprinid (carp) in Europe. It can grow 80 cm (2 ft 8 in) in size and can weigh from 10 to 15 kilograms (20 to 30 lbs). It is warm water fish that originated from Eastern Europe (basins of the Black Sea, the Azon Sea, and the Caspian Sea). Carp like water rich in grass, calm and warm in summer. They live n ponds, shallow lakes, lands and In the water courses of the bream zone (Grolier, 1991).

Carps are omnivorous. They eat planktonic organisms as well as animalcules living along the banks and at the bottom (Grolier, 1991).

The cultivation of the cyprinids has been practiced for centuries on the coast of Europe and Asia. It is probably the oldest form of, more or less, intensive fish cultivation in fresh water yet at the same time it covers the widest areas (Huet, 1994).

The cultivation of the cyprinids is principally concerned with the table but with certain regions they are also cultivated for restocking.

Algae are also a diverse group of primarily aquatic, mostly plantlike organisms that occur in such dissimilar forms as microscopic single cells, loose, filmy conglomerations, matted or branched colonies, or giant seaweeds with root like hold fasts and structures resembling stems and leaves. Algae manufacture their own food through the process of photosynthesis. Because of this, algae are the main source of food for other aquatic organisms (Grolier, 1991).

The Philippines is also rich in sea grasses as it is in fishes and because of this, the common Hydrilla are scientifically known as ***Hydrocharitaceae verticillata*** was chosen as the first independent variable for the thesis.

Hydrocharitaceae verticillata is a monotypic genus with an elongated, branched, leafy, submerged herb. Its leaves are short, in whorls, or the lower ones opposite. Male flowers solitary, shortly pedicelled, in a subglobose, sessile, muricate spathe; sepals 3, ornate and green; petals 3, oblong or wedge-shaped; stamens 3, the anthers large, uniform. Female flowers 1 or 2, sessile, in a tubular, two-toothed spathe, the perianth on the staminate flowers but the segment narrower; ovary produced beyond the spathe in a filiform beak, one-celled; styles 2 or 3. Fruit tubulate, smooth or muricate, seeds 2 or 3, oblong (Merrill,1976).

Artificial feeds were chosen for the second independent variable because they are the next common feeds for fish. Artificial feeds or feeding are one of the artificial methods of increasing production in fish cultivation. Its importance varies accordingly to the intensity of cultivation, for the latter can be extensive, semi-intensive or intensive (Huet, 1994).

One common artificial feed is the fish meal. Fish meal is prepared will spoilt fish, fish practically of no value, and heads and wastes left over for the production of fish oils. Fish meal is always prepared from sea fish but naturally prepared from fresh water fish which have the same

nutritional value but it is exceptional to find in sufficient quantities to make the operation economically viable (Huet, 1994). It provide highly nutritional diets that will both maintain the health of the animals and increase the quality of such end products such as meat. Though formerly important as fertilizers, fish meal is now primarily used as animal feed----- especially for farm-raised fisheries (Grolier, 1991). These are the reasons why the fish meal was chosen for the second independent variable of the thesis.

With presented information and data, the researchers decided to make a comparative study between the two different feeds, natural and artificial, on their effects on the weight and growth of fish. Furthermore, their effects on their weight and growth of the carps will be determined after two months.

B. STATEMENT OF THE PROBLEM

The study was basically designed to answer the question: In which type of food (***Hydrocharitaceae verticillata***) or artificial feeds, will carps (***Cyprinus carpio***) gain more weight?

C. OBJECTIVES OF THE STUDY

Primarily, the study was aimed at comparing the effects of natural food (hydrilla) and artificial feeds, fishmeal, on the growth of the carps. The study has also the following specific objectives:

1. To determine which type of food, natural or artificial, will result to increased growth of the carp in terms of weight (grams) after six weeks of culture period.
2. To measure the water quality of the culture medium.

D. SIGNIFICANCE OF THE STUDY

Nowadays, people need to be practical in their way of living. They need to save money because of the present economic crisis the country and the whole of Asia is suffering.

Fish, as main food for the Filipinos are cultured in hatcheries and ponds. They will be sold in shops and markets and will then proceed to our homes. In order to produce nutritious and healthy fishes, the right way of feeding the fishes is imperative in fish cultivation. The correct food the fish will eat is highly considered. They will need food that will give them more weight and make them grow nutritionally suited for people's consumption.

The study was conducted because the people need to know that the fish they eat will supplement them with the nourishment their body needs. The significance of the study was focused on producing more supplemental way of feeding the carps in order for them to meet the

people's needs. And if a supplemental and productively healthy way of feeding the carp will be known, people can be sure that the fish they partake is nutritious and healthy. The study can also help the people to save, especially those who own hatcheries by determining the more effective food for the fishes, the carps especially.

E. SCOPE AND LIMITATIONS

The study was conducted within the months of September and October, 1998 at Philippine Science High School – WV. *Cyprinus carpio* or carp was the only dependent variable used in the study. Natural food, particularly the hydrilla, and artificial feeds such as fishmeal were the two independent variables.

The basis of data depended on the weight the carps gained each week, and the totality of the data was known and computed after six weeks of study.

F. DEFINITION OF TERMS

Algae - a member of the large group of nonvascular plant belonging to any seven phyla of thallophytes

Artificial fish food (fishmeal) - made from spoiled flesh of fish, particularly left-overs from the production of fish oils used as food for farming fishes

Brackish waters - impure, slightly salty water

Carp - the most important cyprinid

Comparative study - a study between two or more variables being compared

Dioecious - the male and female flowers on different plants

Fish - a member of Pisces, a class of back-boned aquatic animals, many of which yield flesh that is highly nutritious, and some yielding oil for food or for industrial use

Independent variable - a variable that manipulate the experiment

Monoecious - a male or female flowers on the same plant

Muricate - beset with short and hard or prickly points

Parietal – relating to, or forming the walls of an anatomical structure; attached to the walls of the ovary or fruit

Pedicel - the stalk of a single flower

Perianth - the calyx or corolla collectively

Seaweeds - any marine plant especially a marine alga widely distributed in the oceans and are found floating or attached at considerable depth by specialized attachments

Serrulate - seaweeds with fine teeth

Sessile - attached with the base; without any stalk

Spathe - a bract which encloses an inflorescence as in the Araceae

Taxonomy - a study and description of the variation of organism

CHAPTER II

REVIEW OF RELATED LITERATURE

A. FISH RESOURCES AND FISH FAUNA OF THE PHILIPPINES

The Philippine archipelago consists of more than 7,000 islands, large and small, with a coastline extending more than 18,000 kilometers. The waters include great areas of vastly varying depths permeated by inter-island seas which are considered important for fishing purposes. Located in the center of the Indo-Pacific basin, the Philippines is bounded in the east by the Pacific Ocean, in the west by the China Sea, and in the south by the Celebes Sea which is known to be the most abundant in fish .

Scattered over the major islands are the fresh water resources like lake, river, streams, reservoir, ponds, marshes and swamps. These inland waters are homes of a number of natives as well as introduced fresh water fish species.

With such resources attributes, the Philippines is rich in fisheries resource particularly in the number of fish species, thus making the fishery industry of great economic importance. Fish is major source of animal protein in the diets of nearly 54 million Filipinos. The industry provides employment, either directly or indirectly, and millions of Filipinos are engaged in fishing, fish processing, fish farming, fish marketing and

trading and other allied gross national product in 1984 (Bureau of Fisheries and Aquatic Resources Statistics, 1984).

Because of the great importance of fish resources to the economy, the development of the same should receive the attention and best efforts of the government and its people. Through ecological surveys, efforts should be directed towards determining to distributions, habits, habitats as well as the basic taxonomic revisions and accurate identification of fishes.

B. FISH MORPHOLOGY

Cyprinus carpio Linnaeus

Common name: Common red carp, Karpa (Tagalog); Babangan (MST)

It has an oblong, compressed body; length is normally three times its depth. Body covered with large cycloid scales which do not extend to head. Snout is rather blith mouth protractile, and has two barbels on each side of the upper jaw. Pharyngead bone well – developed and has small molar – like teeth. Dorsal and anal fins have three spikes anteriorly of which two are well – developed; of these the posterior is the longer and more serrated behind. Caudal moderately forked.

The fish has been domesticated for many centuries. Its weight is about 1 – 2 kilograms but seldom reaches 15 kilograms.

C. BIOLOGY

This carp is a river fish suitable for cultivation in fresh water ponds, reservoirs and rice fields and also in brackish waters. It dwells in shallow areas, especially near the embarkment of lakes, rivers and in mundated lands that overflow with water during floods and where water flows slowly. ***Cyprinus carpio*** is classified as omnivorous. The young fry feed in protozoa and small crustaceans and from about ten centimeters in length the bulk of food consists of bottom-dwelling animals such as Chironomidae, Ephermidae, Trichoptera, Tubrificidae, and Mullosca. These organisms are eaten together with quantities of, more or less, decayed vegetable matter and epiphetic plankton. Food is located by taking bottom mud into the mouth, sifting out digestible particles and rejecting the rest. This feeding habit destroys benthic vegetation and makes the water turbid. In searching for worms and insects larvae, it burrows into the embarkments.

This species is omnivorous, producer adhesive, transparent, dimersal eggs, creamy or yellowish in color and are attached by the female fish on aquatic plants or other objects. Embryos hatch out within six days at a water temperature of 18 degrees Centigrade, within three days at a temperature of 25 degrees Centigrade, and within two days at 30 degrees Centigrade. A rasping noise is produced during breeding due to rubbing of one fish to another. Spawning in open waters is through out the year with

a peak period from January to April and also at the beginning of the rainy season when river margins become flooded.

The carps are economically important because they are excellent as food.

D. GENERAL CHARACTERISTICS OF CARP

Carp is the principal farmed cyprinid in Europe. It can reach 80 cm in size and can weight from 10 to 15 kilograms. It is a warm water fish. It can only be raised in water which warms sufficiently during the growing season. Development diminishes as the temperature falls. Below 13 degrees Centigrade its growth will be greatly reduced and it will stop eating when it falls below 5 degrees Centigrade. In ponds with an average summer temperature between 15 and 18 degrees they can live and can even grow sufficiently but they will not reproduce. When it is very cold, the carp refuge on the bottom of the deepest part and become lethargic. Their growth rate can be followed, more or less, clearly from their scales which also assist in determining the age. This is done by the scalimetric method.

Carp like water rich in grass, calm and warm in summer. They live in ponds and shallow lakes, canals and in the water courses of the bream zone.

The raising of carp is wide – spread in the Far East. The United States and Canada, carps are generally considered a nuisance for they have

invaded the warm, turbid and open waters where they compete with the indigenous species.

Their eating habits are omnivorous. Carps eat planktonic organisms as well as animalcules living near the banks and on the bottom.

E. HYDROCHARITACAEA (EEL GRASS FAMILY)

Aquatic, fresh or salt water herbs, with simple, individual leaves. Flowers monoecious or dioecious, enclosed in an entire or two – leaved spathe. Sepals three, green or petalloid. Petals three or none. Stamens three to fifteen; anthers erect. Ovary inferior, the placentas parietal or projecting; styles on style arms three to twelve. Fruit rarely dehiscent, membranaceous or fleshy, few to many seeded.

Genera 14, species about 60; 6 Genera and 10 species in the Philippines.

1. Fresh – water herbs.
2. Stems, branched, leafy,

   elongated, the leaves whorled.....1. Hydrilla

   2.1 Stemless or with stolons only
3. Leaves very long and

   Narrow, ribbon – like; perianth.....2. Vallisneria

   3.1 Leaves broad, the floating

   ones up to 20 cm in width;

perianth double.....3. Ottelia

1. Salt – Water herbs; stems slender, creeping

2. Stamens 3.....4. Halophila

3. Stamen 6.....5. Thalascia

HYDRILLA

An elongated, branched, leafy, submerged herb. Leaves short, in whorls, or the lower ones opposite. Male flowers solitary, shortly pedicelled, in a subglobose, sessile muricate spathe; sepals three; ovate, green; petals 3, oblong or wedge – shaped; stamens 3, the anthers large, reniform. Female flowers one or two, sessile, in a tubular, two - toothed spathe. The perianth as in the staminate flowers but the segments narrower; ovary produced beyond the spathe in a filiform beak, one – celled; styles 2 or 3. Fruit subulate, smooth or muricate, seeds 2 or 3 oblong. A monotypic genua.

H. verticillata

Submerged in still or slowly running water, forming large masses, often 2 meters long. Leaves 4 to 8 in a whorl, thin, narrowly oblong, serrulate, 0.5 by 1.5 cm long. Flowers about 6.5 cm long, the perianth very variable, the male flowers escaping from the sheaths, when mature, and floating on the surface of the water.

Abundant in fresh-water Esteros, and in the Marikina River; widely distributed in the Philippines. Europe through Asia to the Mascarene Islands, Malaya and Australia.

F. ARTIFICIAL FEEDING AND AQUAFEEDS

Artificial food or feeding is one of the important methods of increasing production in fish cultivation. Its importance varies to the intensity of the cultivation, for the latter can be extensive, semi-extensive, or intensive. In certain types of fish cultivation, artificial food can be the exclusive basic food of the fish which become independent of the medium in which they are cultivated. The artificial feeding of fish allows high stocking and the better use of natural food and the excrements of a denser population --- which in turn acts as fertilizer. The practice of intensive feeding is more or less simply an economic question. This depends on the cost of the food used and their conversion rate (Huet, 1994).

The many fish species have different nutritional requirements depending on their growth stage, and this refers to the composition as well as granulated form of formulated feed. The main constituents of aquafeeds are: energy suppliers protein, fat and carbohydrates, crude fiber, vitamins and minerals. The list of raw materials commercially processed

economical to manufacture, process, store and feed by automatic equipment (Agriscope, 1996).

Dry feed is manufactured in a wide variety of forms; meal and flakes and granulates in the forms of crumbles, pellets, and extrudates (Agriscope, 1996).

H. DRY AND CONCENTRATED FOODS

The use of dry concentrates as food is relatively recent in fish farming . It is gradually becoming generalized after having been developed largely, for feeding cattle and poultry. The results and methods and preparations of food for fish and in fact, many manufacturers make foods for different kinds of farming. Generally, the markets prepare different foods according to the species of fish and the stages of raising (Huet, 1994).

The purpose above all was to reduce the labor cost, ensure regular supplies and easy storage and also to use automatic food dispensers (Huet, 1994).

CHAPTER III

METHODOLOGY

A. GATHERING OF MATERIALS

The test organisms, carp, were bought from Aqualine Supply Center in Iloilo City at their one month age. The test specimens were then placed inside the aquariums containing fresh water.

The other variables, fishmeal and hydrilla, were also bought from Aqualine Center and Biotech.

The test organisms were placed inside the aquarium covered with wire screens. There were four aquariums wherein two (the other one served as replicate) were placed with carps fed with hydrilla, and the other two (other one served as replicate) with carps fed with fishmeal.

B. PREPARATION OF MATERIALS/SET-UP

B.1 Preparation of containers

The aquariums were filled with water taken from the faucet. These aquariums were impregnated with oxygen through aerators. The set up needed two aerators, one in each pair of aquariums. Each aquarium contained two airstones which was connected to the aerator with plastic tubes. Since there were only two aerators for four aquariums, the tubes which were connected to the airstones were splitted by splitters.

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The aquariums were arranged and placed to the one side of the Science Research Laboratory.

B.2 Weighing of test organisms

Each aquarium has five test organisms. In order to lessen the labor of the researchers, the test organisms were weighed.

First, a special container was half-filled with fresh water, then it was weighed in the top-loading balance and the result was recorded.

A test organism was placed into the weighing container, and was weighed. The results were then recorded. This process was repeated until the last of the specimens had been weighed, and the results had been recorded.

The resulting weight values of each organism were subtracted by the weight results of the container with water. In other words, the actual weight of the fish is the difference between the weight of the container with water and the weight of the container with water and a specimen.

B.3 Preparation and feeding of Hydrilla

The Hydrilla were removed from its container and were cleaned, dried and were placed in a dry container. These dried hydrilla were weighed and fed to the specimens.

B.4 Preparation and Feeding of Fishmeal

The bought fishmeal was placed in a dry container and were kept from direct sunlight. This variable was then weighed and fed to the organisms.

C. EXPERIMENT PROPER

Materials:

PH meter

DO meter

Top-loading balance

2 aerators

4 aquariums

8 airstones

4 splitters

C.1 Feeding of the cyprinids

The carps were fed every afternoon at about 3:30. The amount of food that were given to the carps was 10% of their average body weight. The excess food water gathered if possible, before feeding the carps again. The waters in the containers were changed every week.

C.2 Weighing of the cyprinids

The same as in B.2 Weighing of the Organisms, was applied in this phase. First, the container was half-filled with water, then it was weighed on the top-loading balance and the results were recorded.

Secondly, the test organisms that have undergone the feeding were placed into the weighed container, one by one, and was weighed in the top-loading balance and the results were recorded.

The process went exactly the same until the last of the organisms was weighed and the results were recorded.

The resulting weight values of each test organisms were subtracted by the weight result of their corresponding container of water.

C.3 Recording of Results

The results after the previous step were recorded and a certain statistical test was applied in order to gain specific results such as the actual weight of the fishes.

C.4 Statistical test

Due to the number of data and results derived from the study, T-Test was used.

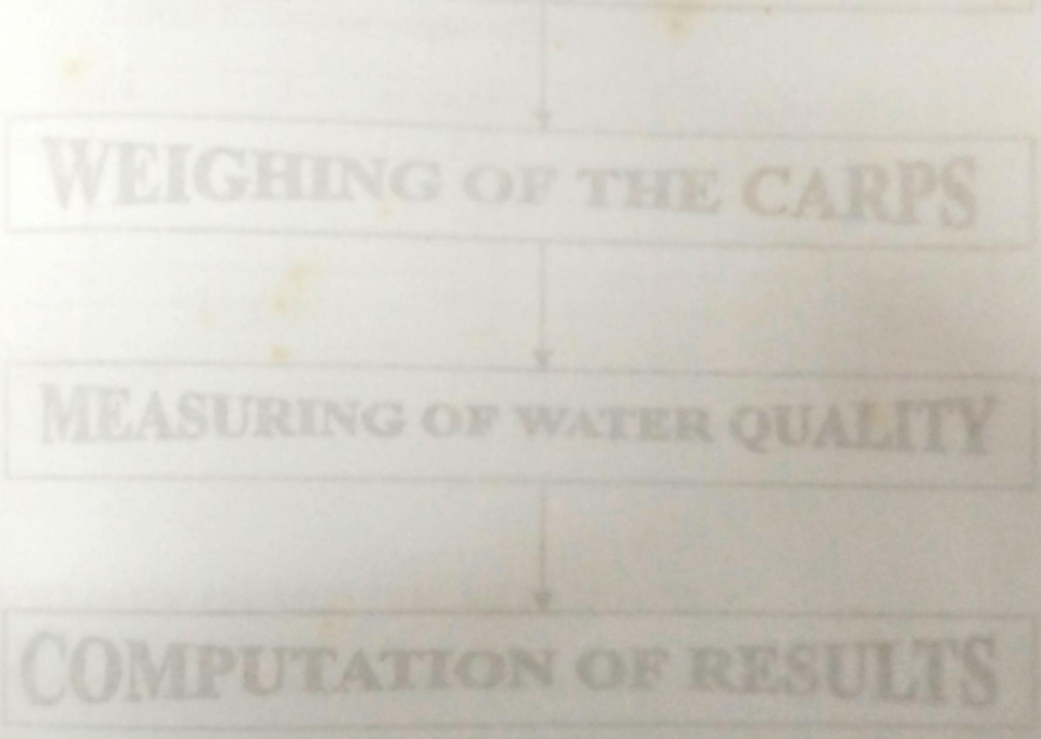

Figure 1. Flowchart of the Methodology

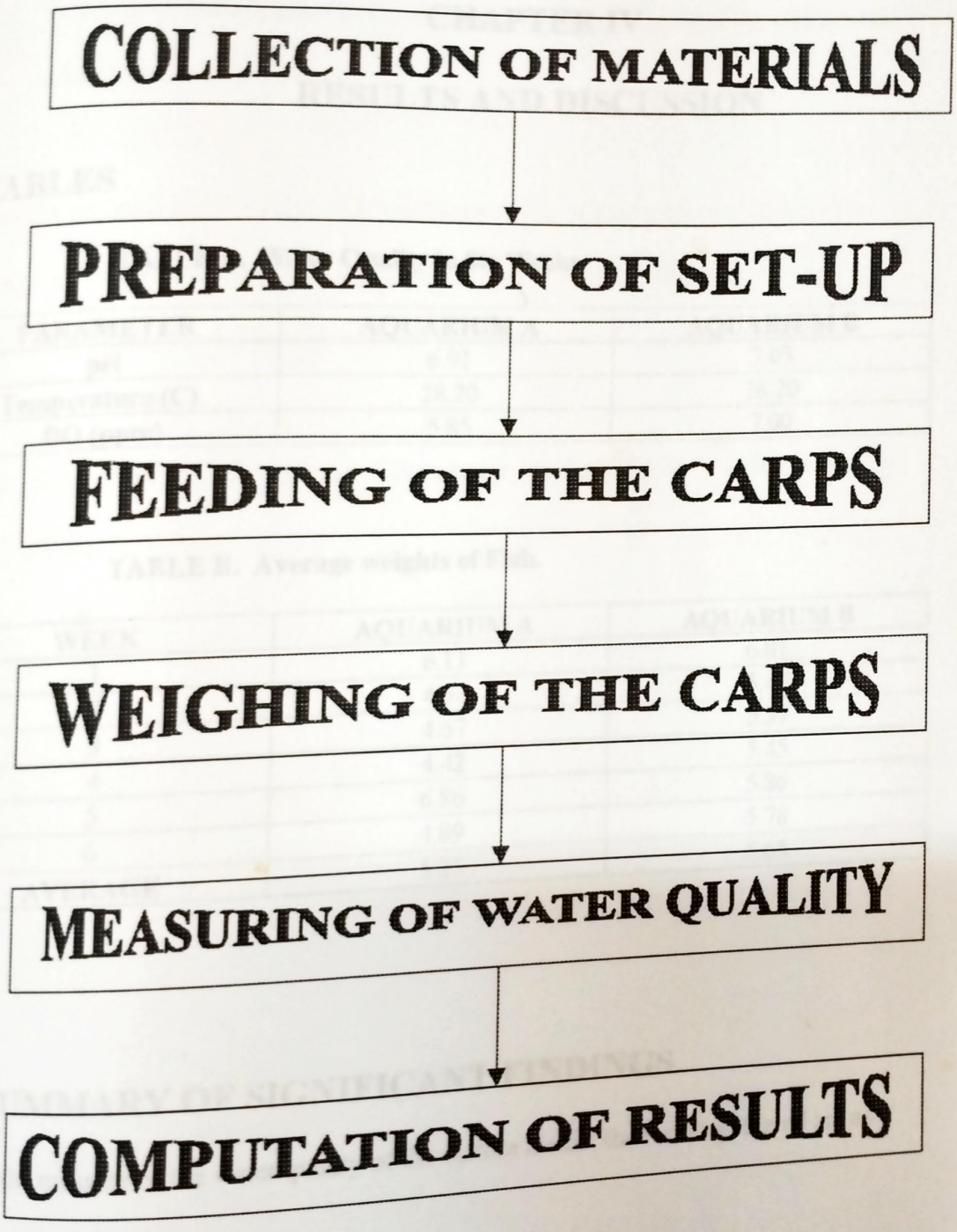

Figure 1. Flowchart of the Methodology

CHAPTER IV

RESULTS AND DISCUSSION

I. TABLES

TABLE A. Water Quality in Six Weeks.

PARAMETER	AQUARIUM A	AQUARIUM B
pH	6.91	7.03
Temperature (C)	28.20	28.20
DO (ppm)	5.85	7.00

TABLE B. Average weights of Fish.

WEEK	AQUARIUM A	AQUARIUM B
1	6.11	6.01
2	4.57	5.45
3	4.67	5.37
4	4.42	5.45
5	6.86	5.86
6	4.89	5.78
AVERAGE	5.25	5.65

II. SUMMARY OF SIGNIFICANT FINDINGS

- In the measure of the water quality of the culture media, the results gathered are as follows:

1. Aquarium A yielded the pH of 6.91, while Aquarium B yielded 7.03 pH.
2. Both aquariums yielded the average temperature of 28.20 degrees centigrade.

3. In the dissolved oxygen content of the culture media, aquarium A yielded 5.85 while B yielded 7.00 ppm.

- In the measure of the weight of the fishes receiving respective feeds , hydrilla for Aquarium A and fishmeal for Aquarium B, the results are as follows:

1. The Aquarium A fishes yielded the average weight of 5.25 grams after six weeks of study.
2. The Aquarium B fishes yielded the average weight of 5.65 grams after six weeks of study.

CHAPTER V

CONCLUSION AND RECOMMENDATIONS

A. CONCLUSION

There is no significant difference between the natural food, ***Hydrocharitaceaea verticillata***, and artificial feeds, fishmeal, on the growth of ***Cyprinus carpio*** in terms of weight as proven by the results and statistical test.

B. RECOMMENDATIONS

For better results the equipment used in the measuring of the water quality of the culture media and the weighing of the test specimens should be properly and accurately calibrated. A longer period of time in experimentation, the feeding and the weighing of fish, will also yield more accurate results. Equality in the size and dimension of the aquariums may somehow affect the growth of carps, so it would be better if the aquariums will be uniform in size and dimension. Cleanliness of the working area, as well as proper adherence to the schedule is also imperative for this study.

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APPENDICES

A. TABLES

FIRST WEEK RESULTS

1. WATER QUALITY

AQUARIUM A1	pH	Temperature (c)	Dissolved Oxygen (ppm)
Trial 1	6.73	29	6.61
Trial 2	6.78	28.2	6.88
Trial 3	6.83	28.9	4.65
AQUARIUM A2			
Trial 1	7.36	29.9	5.62
Trial 2	7.28	29.1	5.21
Trial 3	7.22	29.1	6.22
AQUARIUM B1			
Trial 1	6.41	28.7	4.62
Trial 2	6.42	28.8	4.98
Trial 3	6.41	28.9	4.50
AQUARIUM B2			
Trial 1	5.81	28.7	4.44
Trial 2	5.86	28.6	4.47
Trial 3	5.91	28.7	4.20

2. WEIGHT OF FISH IN GRAMS

FISH	AQUARIUM A1	AQUARIUM A2	AQUARIUM B1	AQUARIUM B2
1	4.41	9.94	5.64	5.99
2	6.16	3.37	3.77	4.05
3	5.53	4.98	5.60	5.32
4	7.44	4.60	6.14	7.79
5	7.29	4.73	7.36	8.44
AVERAGE	6.70	5.52	5.70	6.32

SECOND WEEK RESULTS

1. WATER QUALITY

AQUARIUM A1	pH	Temperature (c)	Dissolved Oxygen (ppm)
Trial 1	5.92	28.5	5.0
Trial 2	6.02	28.4	5.30
Trial 3	6.15	28.4	5.11
AQUARIUM A2			
Trial 1	6.17	28.5	5.22
Trial 2	6.22	28.4	5.34
Trial 3	6.29	28.4	5.67
AQUARIUM B1			
Trial 1	6.33	28.4	6.7
Trial 2	6.52	28.4	7.36
Trial 3	6.55	28.3	7.30
AQUARIUM B2			
Trial 1	6.61	28.4	8.21
Trial 2	6.72	28.4	8.54
Trial 3	6.82	28.3	7.47

2. WEIGHT OF FISH IN GRAMS

FISH	AQUARIUM A1	AQUARIUM A2	AQUARIUM B1	AQUARIUM B2
1	2.33	5.05	3.47	6.15
2	4.79	3.96	5.24	6.46
3	3.69	5.32	5.33	5.69
4	5.81	4.78	5.80	5.37
5	5.10	4.85	5.52	5.47
AVERAGE	4.34	4.80	5.07	5.83

THIRD WEEK RESULTS

1. WATER QUALITY

AQUARIUM A1	pH	Temperature (c)	Dissolved Oxygen (ppm)
Trial 1	6.17	28.4	6.08
Trial 2	6.38	28.4	6.13
Trial 3	6.21	28.4	6.15
AQUARIUM A2			
Trial 1	5.98	28.2	5.98
Trial 2	6.07	28.1	6.02
Trial 3	5.88	28.1	5.85
AQUARIUM B1			
Trial 1	6.02	28.5	6.82
Trial 2	5.79	28.5	6.35
Trial 3	6.29	28.5	6.47
AQUARIUM B2			
Trial 1	6.29	28.5	5.85
Trial 2	6.15	28.5	6.09
Trial 3	5.97	28.5	6.12

2. WEIGHT OF FISH IN GRAMS

FISH	AQUARIUM A1	AQUARIUM A2	AQUARIUM B1	AQUARIUM B2
1	4.69	5.05	4.84	6.03
2	3.92	4.80	5.55	5.32
3	4.79	4.22	5.31	5.32
4	4.58	4.72	3.80	6.91
5	4.48	5.43	5.27	5.37
AVERAGE	4.49	4.84	4.95	5.79

FOURTH WEEK RESULTS

1. WATER QUALITY

AQUARIUM A1	pH	Temperature (c)	Dissolved Oxygen (ppm)
Trial 1	8.45	28.7	4.73
Trial 2	7.88	28.5	5.37
Trial 3	7.91	28.5	5.20
AQUARIUM A2			
Trial 1	8.17	28.4	4.12
Trial 2	7.81	28.5	4.82
Trial 3	7.99	28.6	4.38
AQUARIUM B1			
Trial 1	8.65	28.1	7.92
Trial 2	7.82	28.5	7.29
Trial 3	8.02	28.7	7.58
AQUARIUM B2			
Trial 1	8.66	28.2	8.28
Trial 2	7.98	28.5	7.58
Trial 3	8.38	28.3	7.83

2. WEIGHT OF FISH IN GRAMS

FISH	AQUARIUM A1	AQUARIUM A2	AQUARIUM B1	AQUARIUM B2
1	4.55	3.83	5.55	6.64
2	4.80	4.76	5.08	5.90
3	4.80	4.88	3.72	5.21
4	3.73	5.01	4.81	5.54
5	4.23	3.63	5.31	6.85
AVERAGE	4.42	4.42	4.89	6.01

FIFTH WEEK RESULTS

1. WATER QUALITY

AQUARIUM A1	pH	Temperature (c)	Dissolved Oxygen (ppm)
Trial 1	6.66	27.6	6.55
Trial 2	6.69	27.7	5.80
Trial 3	6.71	27.7	5.62
AQUARIUM A2			
Trial 1	6.52	27.6	4.60
Trial 2	6.55	27.6	5.30
Trial 3	6.59	27.6	4.50
AQUARIUM B1			
Trial 1	6.44	27.6	5.96
Trial 2	6.47	27.6	5.62
Trial 3	6.51	27.7	6.08
AQUARIUM B2			
Trial 1	6.15	27.6	5.80
Trial 2	6.33	27.6	6.40
Trial 3	6.37	27.5	6.42

2. WEIGHT OF FISH IN GRAMS

FISH	AQUARIUM A1	AQUARIUM A2	AQUARIUM B1	AQUARIUM B2
1	4.14	5.13	3.65	4.92
2	6.04	4.26	6.32	6.78
3	3.91	4.53	5.07	5.43
4	3.99	5.50	7.14	5.05
5	5.06	3.86	5.53	5.95
AVERAGE	4.63	4.66	5.54	5.63

SIXTH WEEK RESULTS

1. WATER QUALITY

AQUARIUM A1	pH	Temperature (c)	Dissolved Oxygen (ppm)
Trial 1	6.55	27.6	6.56
Trial 2	6.54	27.5	5.96
Trial 3	6.37	27.9	5.62
AQUARIUM A2			
Trial 1	6.43	28.0	6.88
Trial 2	6.67	27.9	6.80
Trial 3	6.51	27.9	6.77
AQUARIUM B1			
Trial 1	6.76	27.8	6.74
Trial 2	6.69	27.8	6.69
Trial 3	6.64	27.7	6.72
AQUARIUM B2			
Trial 1	6.61	27.9	6.43
Trial 2	6.56	28.2	6.54
Trial 3	6.52	28.0	6.38

2. WEIGHT OF FISH IN GRAMS

FISH	AQUARIUM A1	AQUARIUM A2	AQUARIUM B1	AQUARIUM B2
1	4.40	4.80	4.00	6.60
2	5.30	4.60	6.10	5.10
3	5.40	4.00	6.50	6.00
4	4.20	5.40	5.90	6.30
5	5.50	5.30	5.70	5.60
AVERAGE	4.96	4.82	5.64	5.90

B. PLATES

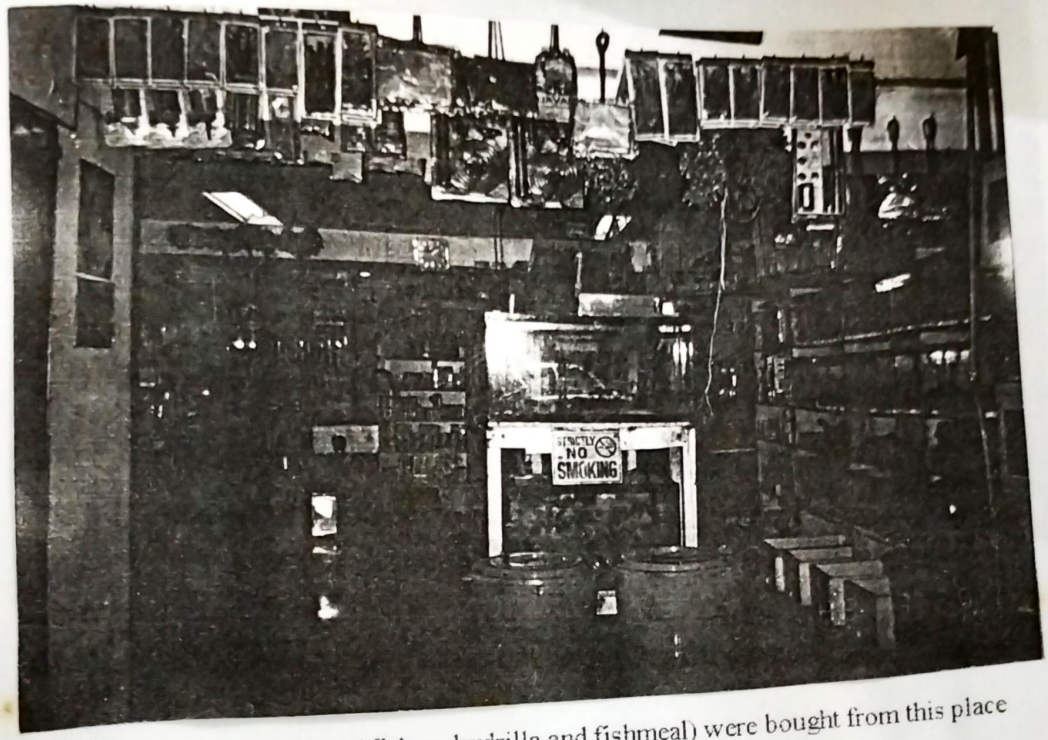

Plate 1. Our variables (fishes, hydrilla and fishmeal) were bought from this place

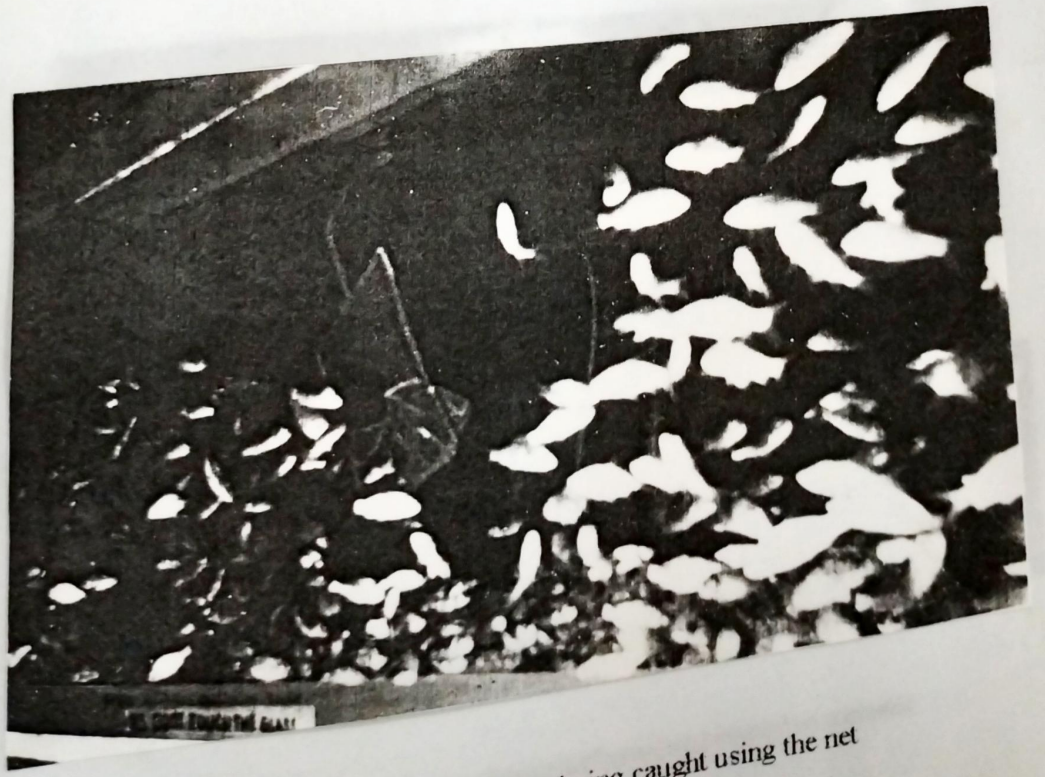

Plate 2. The fishes were being caught using the net

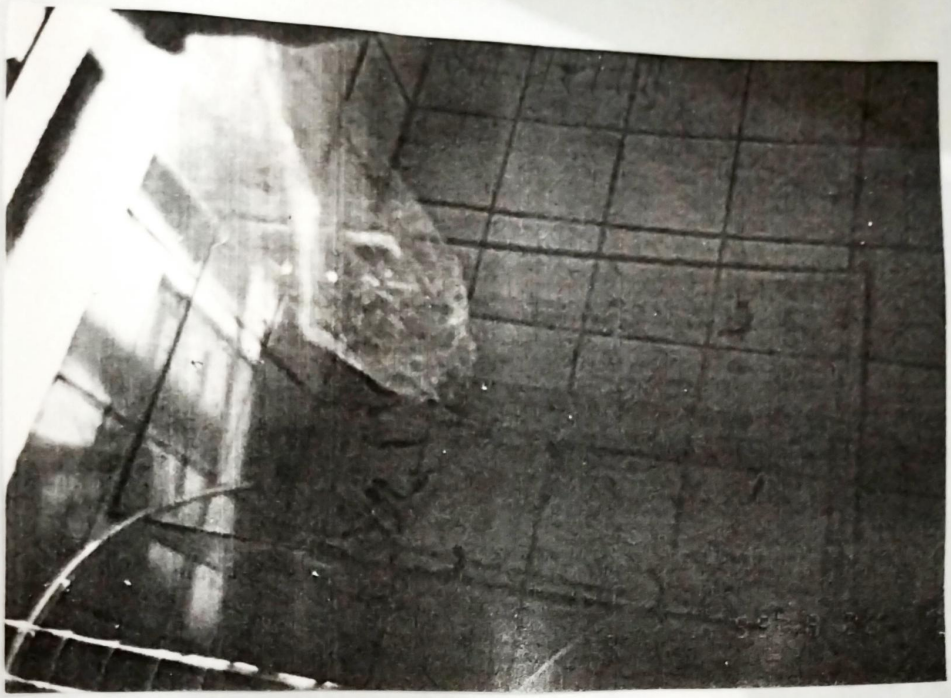

Plate 3. The carps were transferred to an aquarium from a plastic container

Plate 4. Hydrilla were being gathered and placed in a plastic

Plate 5. The hydrilla were air-dried

Plate 6. The equipment used for the study

Plate 5. The hydrilla were air-dried

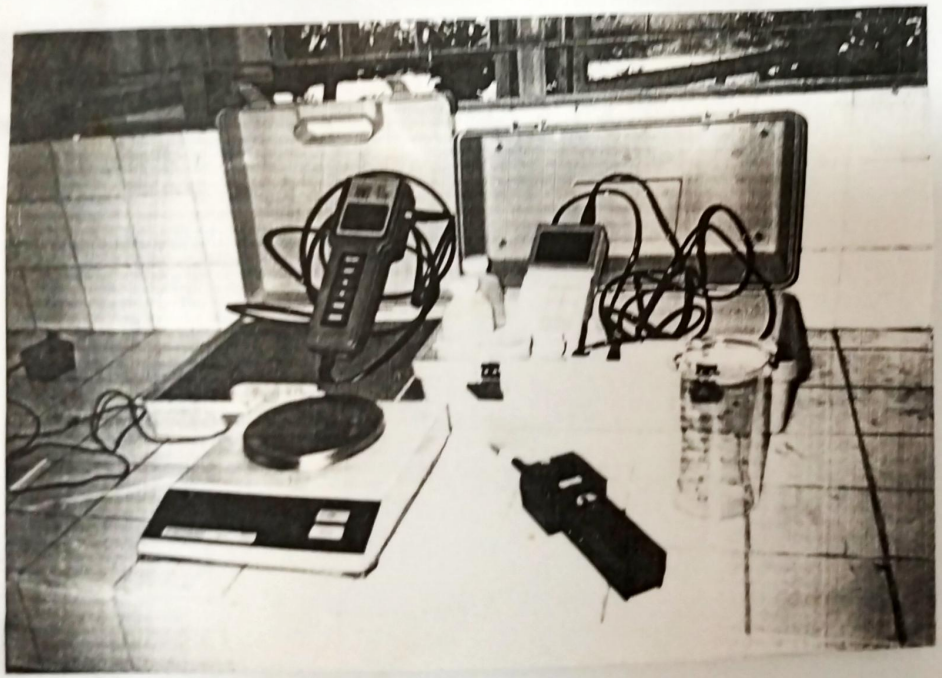

Plate 6. The equipment used for the study

Plate 7. Measuring the water's pH using the pH meter

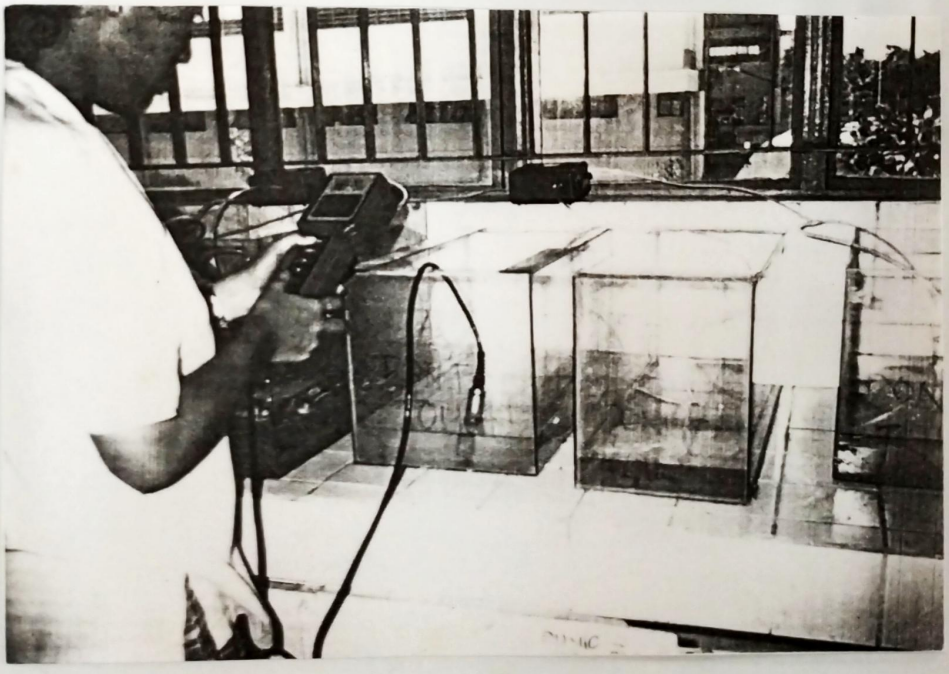

Plate 8. Measuring of the water's temperature using to SCT

Plate 9. Weighing the fish using the top loading balance

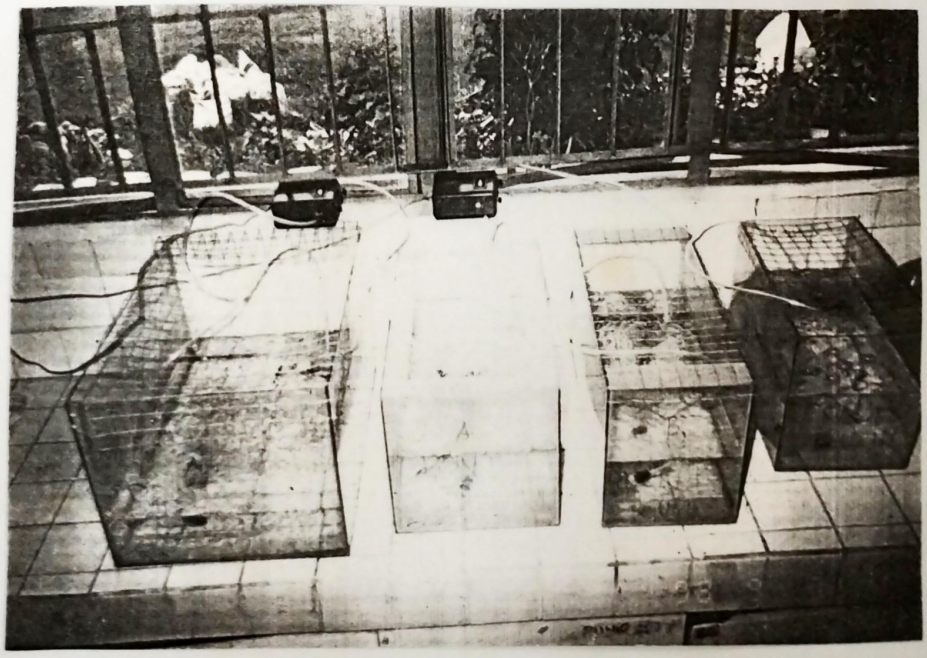

Plate 10. The complete set-up in the Science Research Laboratory

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