

# Improving the Productivity of Common Carp by Utilizing the Method of Alternating With Rice Culture

Yaseen Hamed Farhan

*Ph.D. student, Astrakhan State University, Russia, Ministry of Agriculture, Department of Agricultural Research, Baghdad, Iraq*

**Abstract:** *The experiment was conducted in Iraq, Al Hafria village in Wasit province, 60 km south of the capital Baghdad. The plot belongs to the fishing company "Dijla Fish". Two ponds were used for the experiment, each with an area of 30 dunams (7.5 ha). The experiment lasted four years (2015-2018, starting from mid-March to November in each season). The first season was devoted to the cultivation of fish, the next season to the cultivation of rice. The process of growing carp began in pond no (1) where 22,500 fry were placed, with an average weight of 30 g. In pond no (2) 22500 fry of the same average weight. The planting density is 3000 fish/ha. The results showed positive differences in fish weight after the rice growing season. We attribute this increase to the rich nutrient base and the improvement of the pond created by leftovers from rice farming, including insects and hydrobiont.*

**Keywords:** *Common carp, rice culture, environment*

## 1. INTRODUCTION

In the near future, the world will face a big problem for health and the environment due to antibiotics, growth stimulants and chemical fertilizers that are used in forage and feeding crops. The residues of chemical fertilizers used in agriculture, especially vegetable crops, in comparison with other crops, as a result of their cultivation for more than one season a year, began to have an impact on health and the environment. For example, the remains of nitrate compounds that have been proven to be dangerous to human health. The soil began to weaken due to a decrease in the level of organic matter in it by no more than 1%, besides high temperatures, lack of precipitation and other reasons. So it is difficult to increase the percentage of organic matter in the soil without human intervention (Abu-rian, 2010).

That's how the idea of relying on organic manure arose, being an integral part of maintaining soil fertility and providing plants with the necessary nutrients (Arun, 2001). Thus, farming through crop rotation between agricultural crops and fish will be the best solution to these problems and will contribute to maintaining human health and safety and protecting the environment.

## 2. MATERIALS AND METHODS

The experiment was conducted in Iraq, Al-Hafria village in Wasit province, 60 km south of the capital Baghdad, in a fish farming company "Dijla Fish". Two ponds were selected, each with an area of 30 dunams (7.5 hectares). Ponds are fed by water and drained through channels connected to the Tigris River by pumping station. The experiment lasted for four seasons 2015-2018, starting from mid-March to November in each season. Carp fingerlings (*Cyprinus carpio*) were brought from the Central hatchery (Essaouira), the Ministry of Agriculture of Iraq, which is an important hatchery known for good quality. They were planted in ponds No. 1 and 2 in amount of 22,500 carp fingerlings each, with an average weight of 30 g. The average density was of 3000 fingerlings / ha. In the second season, ponds were prepared for rice cultivation, where the land of the ponds was plowed, divided into fields and flooded with water, and was planted with seedlings of rice of the Yantar variety (Anbar33), which is characterized by good quality and a distinctive smell from other rice varieties.

The fish was grown in a monoculture and fed with feed produced at the company's feed mill. Grain-based feed with a protein content of up to 30% and a fat content of up to 8% are used for carp in Iraq. Concentrated carp feed used by Iraqi fish farmers, as a rule, have the following composition:

Ingredients	%%
Corns	35
Barley (crushed)	20
Fish meal	16
Soya meal	11
Wheat powder	7
Grounds beans	9
Vegetable oil	1
Vitamin and mineral premix	1
Crude protein	24 %
Crude lipid (%)	8 %
Energy (DE) Kcal/Kg	2500- 2700

Feeding in ponds was carried out manually with four feed distributions per day. The daily feed rate is 6 - 4% of the total biomass of fish in the pond. The fish was weighed every two weeks, and on this basis, the amount of feed supplied was adjusted according to the increase in the weight of the fish, the weight is usually determined by catching a random sample of fish with nets in different places, and then collecting the weight and counting the weight.

Oxygen content and temperature values are usually measured every five days using an oxygen meter (WTW of Italian origin). The temperature was measured with a Gallenkamp griffin mercury thermometer of English origin, and the PH was measured with a Hanna device of Italian origin. These measurements continued until the end of the season in November, after which we begin to prepare ponds for use in rice cultivation next season, and cultivation is carried out alternately.

### 3. RESULTS AND DISCUSSION

The study showed that the final average weight of fish in ponds 1 and 2 was 946 g and 900 g, respectively. The biomass was (20007.9 kg/pond) and (18495 kg/pond), respectively. As for the daily weight gain for ponds 1 and 2, it was (3.7 g/day) and (3.55 g/day), respectively. And the biomass for the increase in live weight for each pond is (19373.4 kg/pond) and (178.5 kg/pond), respectively. The amount of feed consumed in Pond No. 1 has reached 90,000 kg, with a feed conversion rate of 4.7 per 1 kg of live weight. In pond No (2), the amount of feed consumed (77,680 kg) with a feed conversion rate of 4.4 per 1 kg of live weight, the amount of fish production in ponds 1 and 2 was up to (2668 kg/ha) and (2466 kg/ha), respectively. The number of dead fish in ponds 1 and 2 was (1,350 fish and 1,950 fishes) respectively. The survival rate was 94% for pond No 1 and 91.3% for pond No 2.

For rice cultivation in March 2016 season, rice was harvested in September 2016, the quantity of rice production in ponds 1 and 2 was (3240 kg/ha) and (3284 kg/ha), respectively. After the end of the fish growing period in mid-November 2017, we received the following results: The number of dead fish in ponds 1 and 2 reached (760) and (675), respectively. The number of dead fish in this season decreased compared to the previous season, the percentage of decline in two ponds (1 and 2) was 56.3% and 65.4%, respectively. The survival rate in ponds 1 and 2 was 96.6% and 97%, respectively. The survival rate increased by 2.6% and 5.7%, respectively, compared to the previous season. We suppose that the reason for the decrease in the number of dead fish and the increase in survival is the use of the alternating cultivation, in which fish ponds were drained for the season and planted with agricultural crop, which led to the elimination of aquatic pathogens. In this method, the life cycle of the pathogens was interrupted, and the pond environment was restored healthy. Naumova and Naumova (2016) also pointed out that draining water of fish ponds according to the new scheme led to the death of pathogens and ensured the cure of fish ponds from parasitic and infectious diseases in foraging ponds. Moreover, the final weight of fish reached 966 g and 1050 g in ponds (1 and 2), respectively, what means the weight of fish increased by (2.12%, 16.67%) compared to the previous season in 2015. The increase in the mass of fish occurred as a result of an increase in the natural food supply. As noted by Lagutkina and others (Lagutkina *et al.*, 2016) - the productivity of commercial fish products in the same areas increases by more than 15% after lettering. This was facilitated by high and stable aquaculture technology.

The average daily weight in the two ponds (1 and 2) reached 3.8 g and 4.16 g, respectively. That is means; it increased by 2.7% and 17.2% compared to the previous season. The biomass gain in two ponds (1 and 2) were (20348.6 kg/pond) and (22261.5 kg/pond), respectively. The amount of feed consumed in ponds (1 and 2) was 73500 kg and 75600 kg, respectively. The feed conversion rate was 3.6 and 3.4 per 1 kg of live weight in two ponds. Thus, it decreased in comparison with the previous season by 23.4% and 22.7% in two ponds, respectively. The high growth rates are due to the use of the fish rotation method, which has been proven by a number of studies in this area. After the end of the 2017 season, we started preparing the land for rice cultivation in the 2018 season. After harvesting, we received a rice production of 3500 kg/ha and 3480 kg/ha in ponds 1 and 2, respectively. There was a noticeable increase in the amount of rice harvest compared to the previous season of 2015 by 8.03% and 6%.

This system increases soil fertility and prevents its degradation, which was shown in an experiment on growing fish in rice fields for 3 years, as the content of nitrogen, phosphorus, potassium and organic matter in the soil increased (Zheng & Deng, 1998). We also noticed that crops grown by the fish rotation method increase their yield, and in other studies we noticed an increase in yield (by 30%) and a decrease in irrigation costs when growing watermelons after aquaculture (Abasova et al. 2018).

The results of monthly weight growth of carp are shown in Table (1). Statistically analyzing the results, we found significant differences in weight ( $P > 0.01$ ) in pond No. 2 between the seasons of 2015 and 2017.

Table (1)

Period	Average Weight /g. Pond №1 2015	Average Weight /g. Pond №1 2017	Average Weight /g. Pond №2 2015	Average Weight /g. Pond №2 2017	SG
March	30	30	30	30	NS
April	106 ±4.68a	110 ±4.68a	103 ±5.90a	121 ±4.36a	NS
May	248 ±8.66a	255 ±15.47a	241 ±6.62a	275 ±19.00a	NS
June	404 ±12.78a	415 ±15.13a	394 ±13.38b	441±16.63ab	NS
July	488 ±14.28a	502 ±28.40a	476 ±14.09b	530 ±33.39a	P>0.01
August	553 ±16.33a	571 ±31.99a	527 ±16.75b	607 ±30.18a	P>0.01
September	689 ±18.48ab	709 ±32.63ab	668 ±18.97b	755 ±32.36a	P>0.01
October	841 ±20.57ab	859 ±32.55ab	817 ±18.73b	911 ±30.33a	P>0.01
November	946 ±32.77ab	966 ±33.90ab	900 ±30.49b	1050±38.54a	P>0.01

### Findings

From the process of fish rotation, we can draw the following conclusions:

- An increase in the survival rate of fish of the previous season by 2.6% and 5.7% in ponds 1 and 2, respectively.
- Fish weight increased by 2.12% and 16.67% in ponds 1 and 2, respectively.
- The amount of feed consumed decreased by 18.3% and 2.7% in ponds 1 and 2, respectively.
- Feed conversion rate decreased by 23.4% and 22.7% in ponds 1 and 2, respectively.
- An increase in the amount of fish productivity by 5% and 23.9% in ponds 1 and 2, respectively, thereby increasing profitability.
- An increase in the amount of rice harvest compared to the previous season by 8.03% and 6% in ponds 1 and 2, respectively.

### 4. REFERENCES:

- [1] Abasova R.T., A.V. Eliseeva, E.R. Akhmedova, 2018. FEATURES OF GROWING AQUACULTURE AND AGRICULTURE OBJECTS ON THE EXAMPLE OF THE SHARAPOVSKY SRC OF THE ASTRAKHAN REGION). Scientific proceedings of Dalrybvvtuz. 2018. No. 1 (vol. 44).

- [2] Lagutkina, L. Yu., K. G. Sheikhasanov, M. A. Pozhidaeva, M. G. Biryukova. 2016. EXPERIENCE OF BIOTECHNOLOGY OF ORGANIC CULTIVATION OF FISH AND CROPS. Bulletin of the AGTU. Ser.: Fisheries. 2016. No 2: 84-93.
- [3] Naumova A.M., Naumova A.Yu. Parasitological monitoring of fish farm factories. Russian Journal of Parasitology, 2016, V. 35, Iss. 1, pp. 54–57.
- [4] Abu-rian, A. M.(2010). The Organic Agriculture (Attributes and Importance for human health).College of Agriculture, Jordan University.1st Edition. Jordan. p322.
- [5] Arun, K. S. (2001). A handbook of organic agriculture. Agrobios, Jodhpur. India. 484pp.
- [6] Zheng, Y. and Deng, G. (1998). Benefits analysis and comprehensive evaluation of rice–fish–duck symbiotic model. Chinese Journal of Eco-Agriculture 6 (1), 48–51 (in Chinese with English Abstract).

### **INFORMATION ABOUT THE AUTHORS**

Yaseen Hamed Farhan - Ph.D. student, Astrakhan State University; 414056, Russia, 20A Tatishcheva str., Astrakhan, e-mail: [yaseenrussia@gmail.com](mailto:yaseenrussia@gmail.com), ORCID: 0000-0002-8804-0837