Marsh Bulletin 8*(2)(2013)159-164*

MARSH BULLETIN

abdulalwan@yahoo.com
.marshbulletin@yahoo.com

Using groundwater in artificial spawning of common carp *Cyprinus carpio*

Jassim H. Saleh

Marine Science Center – Basrah University

Abstract

A comparative study was conducted between groundwater and surface water in the artificial spawning of common carpfish*Cyprinus carpio*. The results showed thatartificialspawning in groundwater occurred earlyabout 45 days before artificial spawning in surface water, the temperature in the groundwater was 22 ˚C and hatching rate was higher in groundwater (85%) than in surface water

1- Introduction

Aquaculture is one of the fast ways in global food production, it is estimated that the production of aquaculture have more than a quarter of what consumed by humans from fish and crustaceans (Naylor*et al.*2000). The production of fish, crustaceans through aquaculture has increased more than twice during the last ten years (Naylor *et al.* 1998).Groundwater is an important and often essential part of wild salmonid habitat, yet ground water use is almost entirely unregulated in British Columbia, groundwater management rarelyconsiders wild salmon, and British Columbia's water policy focuses mainly on surface water (Rpbio,2006). Fish farming means in the desert is bred in the arid lands, as the use of groundwater.The goal of farming in the desert areas is the best use of arable land as well as the groundwater that have high economic value and reduce competition in the use of water and the use system oases for vegetable farming and docks in various forms in fish farming. Egypt is one of the countries that invest desert areas using groundwater (Suloma and Ogata , 2006). Flowers and Hutchinson (2004) founded that the groundwater is good for cultivation of many species of fishes (*Pagrusauratus*,

Acanthopagrusbutchen,Sillaginodespunctat). Also Curry *et al*.(1995) used groundwater in the custody of trout (*Salelinus fontinalis).* Moreover Mohammadi*et al*.,(2011) use of brackish groundwater in incubation and breeding of larvae of the trout *Oncorhynchusmykiss* in the desert of Yazd in Iran. The present study is the first in Iraq in using of groundwater in artificial fish spawning, aiming of exploiting of groundwater in aquaculture.

2-Materials and methods

The study was conducted in oneo the fish hatcheries in the province of Babylon (Figure 1) . Artesian wells was dug to a depth of 10m and water was pumped out to the rearing tanks (Fig. 2). Environmental factors (temperature, oxygen, salinity, pH and others elements) were measured after extracting the water from the well directly. Rotary oxygen generator was used to provide oxygen to the main reservoir hatchery (Figure 3). The process of artificial spawning is conducted on common carp fish. Adult fish were brought to the hatchery and injected with pituitary gland hormones.

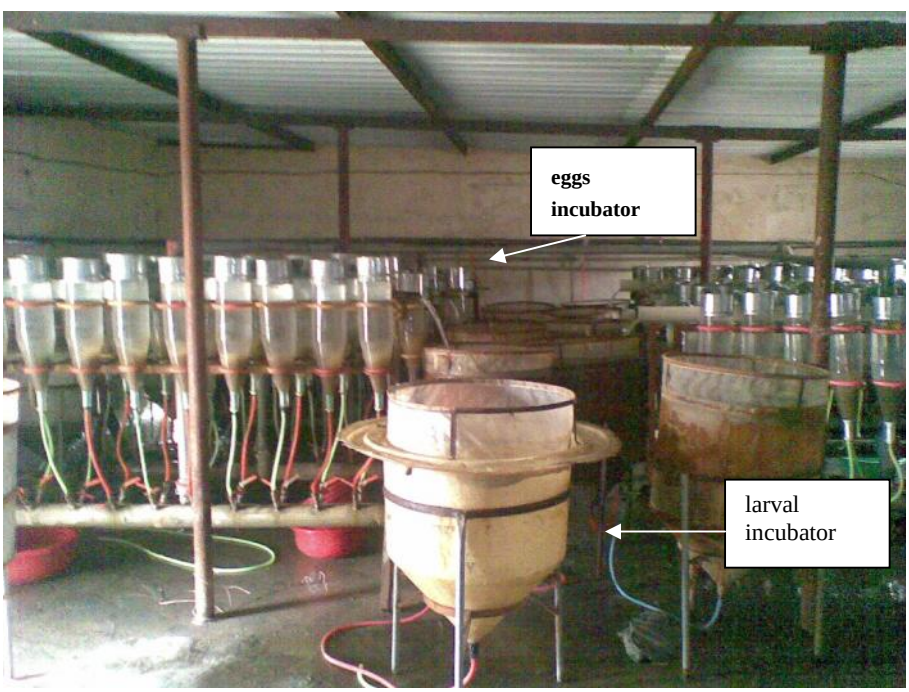

Figure (1): A photograph hatchery in the province of Babylon.

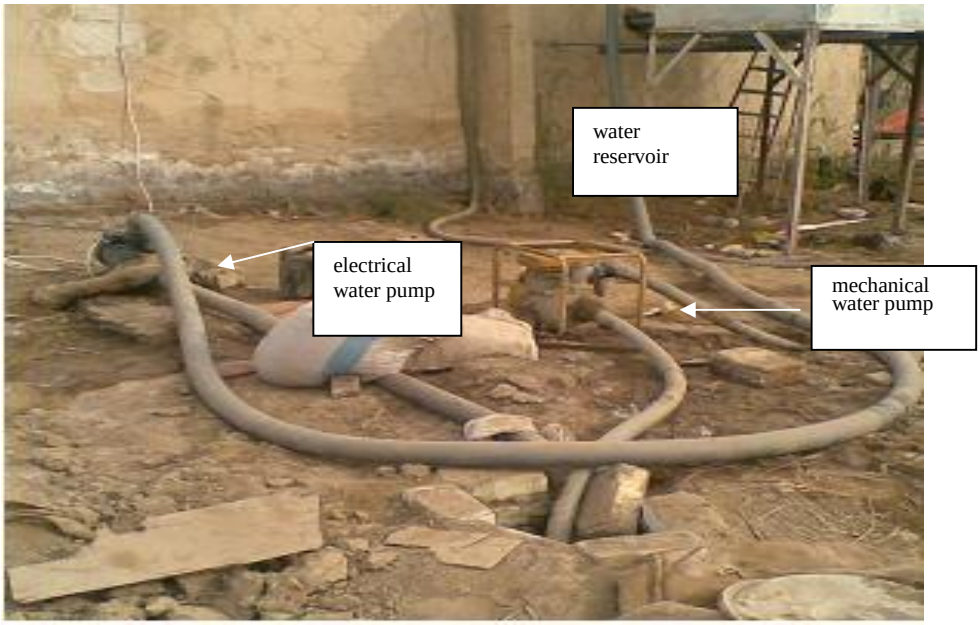

Figure (1): A photograph represents the artesian well used for the processing of hatchery water.

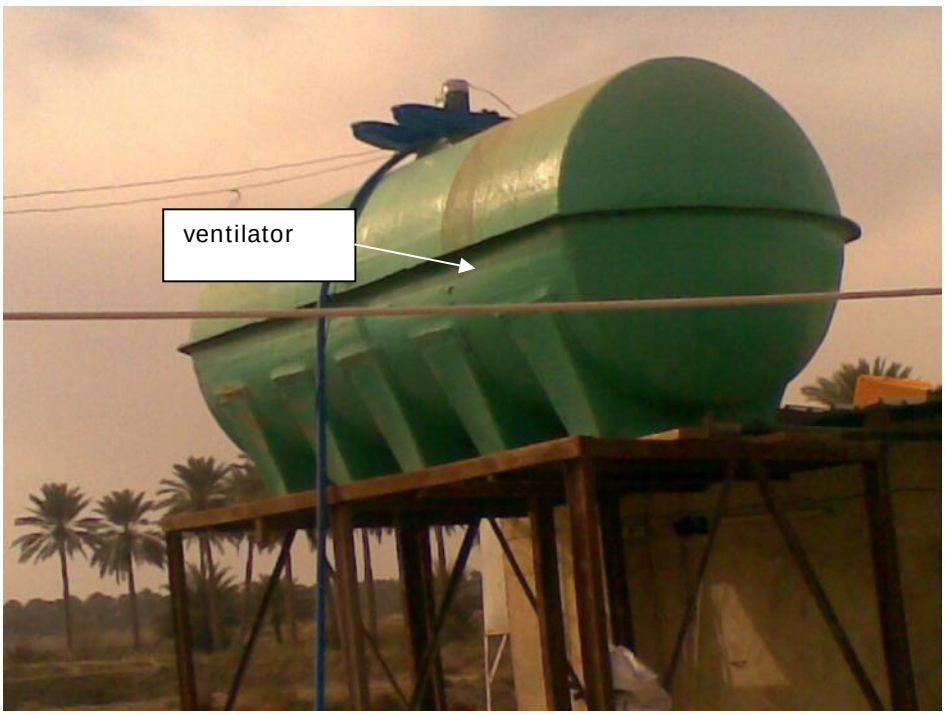

Figure (2): a photograph represent the main reservoir for water and Ventilator.

3- Results

Table (1) showed chemical properties of the groundwater and surface water used in the artificial fish hatcheries in breeding carps.It is apparent that groundwater is containing high concentrations of dissolved substances than surface water.It is worth mentioning that the concentration of dissolved oxygen in the groundwater in the artesian well was 2 mg /L,and rose to about 6mg /L after ventilation.

Table (2) represents a comparison between groundwater and surface water in terms of artificial reproduction of common carpfish.It is obvious that the time between fertilization and hatching is the same in both cases, but the hatching percent was different being higher in the groundwater than the surface water. But it takes about 45 days for the eggs in the surface water to be fertilized than those in the groundwater at the same temperature.

Table (1): Chemicals in groundwater and surface water in the study area.

Substance	Ground water(mg/L)	Surface water(mg/L)
Chloride	**3493.95**	**864.50**
Calcium	**136**	**77.00**
Magnesium	**174.94**	**72.90**
Sodium	**810.66**	**251**
Potassium	**43.45**	**25.67**
Sulphates	**2369.55**	**234.15**
Carbonates	**390.80**	**283.46**
Salinity	**3.33**	**1.40**
pH	**8.11**	**7.91**

Table (2): Comparison between common carp hatching in groundwater and surface water.

Water type	Fertilization date	Hatching date	Temperature º C	Hatching percentage(%)
Ground water	**2011/2/15**	**2011/2/17**	**22**	**85**
Surface water	**2011/4/1**	**2011/4/3**	**22**	**70**

4- Discussion

The results show that the amount of chemicals in the groundwater higher than that in the surface waters.These results are consistent with those of Saleh and Al-Mukhtar (in Press) in their study about the use of groundwater in the common carp fish farming in southern Iraq. In the present study used groundwater and surface water in the process of artificial spawning, and were conducted compare between them in terms of the beginning of the process fertilization of eggs, appeared from the results that the beginning of the fertilization time in the groundwater occurred before the beginning of the fertilization time in surface water as much as 45 days and this is a positive advantage in the process of artificial spawning of fish. Mohammadi*et al*., (2011) used the under ground brackish water fortr out, *Oncorhynchusmykiss*in the desert of Yazd in Iran. The reason for this progress in the fertilization time is temperature as characterized by groundwater high temperature especially the more depth extracted from it, this property can be utilized in winter for incubation fish, and treatment of low temperatures during the night in the desert areas and is characterized by groundwater have not in the other sources. The ground water had higher temperature at low air temperature, especially in the winter and lower temperature in summer (Flowers and Hutch , 2005).

The higher hatchability in the groundwater than in surface water, is due to the reason that the groundwater is pure , clear , without plankton mud and plankton wandering around the fertilized eggs and preventing ventilation, leading to many deaths. Also the groundwater is free from bacteria, fungi and crustaceans that kill a large number of fertilized eggs as in surface water, groundwater regarded as the best types of water for fish farming especially from the microbiological point of view as they are free from any pathogens as well as they do not contain any contaminants, plant or animals organisms or some undesirable fish species which can be transmitted to the tanks with water from other sources (Saleh and Al-Mukhtar,in Press).

5- References

Curry, R. A. ;Noakes, D. L. G. and Morgan, G. E. (1995). Canadian Journal of Fisheries and Aquatic Science. 52(8):1741-1794.

Flowers, T.J .and Hutchinson, W. G.(2004). Productive uses for Saline groundwater using semi-intensive integrated aquaculture. CNRM project. No. 2002/ 016.

Flowers, T.J and Hutchinson, W.G (2005).of the effects of air extraction fans to ventilate aquaculture polytunnels at the

Cooke Plains Inland Saline Aquaculture Centre, South Australia. National inland aquaculture coordination project milestone report, 19pp.

Mohammadi.M. ;Sarsangi, H. ; Askari, M. ; Bitaraf, A. ; Mashaii, N. ; Rajabipour, F. and Alizadeh, M. (2011). Use of Underground Brackish Water for Reproduction and Larviculture of Rainbow Trout, *Oncorhynchusmykiss*. *Journal of Applied Aquaculture*, 23:103–111.

Naylor, R. L., Goldburg, R.G., Mooney, H., Beveridge, M., Clay, J, Folke, C., Kautsky, N., Lubchenco, J., Primavera, J. & Williams, M. (1998) Policyforum: Ecology.Nature's subsidies to shrimp and salmon farming.*Science* 282.

Naylor, R. L., Goldburg, R.G., Primavera, J.H., Kautsky, N., Beveridge, M.C.M., Clay, J. Folke, C., Lubchenco, Mooney, H. and Troell, M. (2000).Effect of aquaculture in the world food supplies.*In* Nature.The down side of fish farming.Macmillans Magazines Ltd. pp. 1017–1024.

Rpbio,T.D. (2006).Review of Groundwater-Salmon Interactions in British Columbia.Waterhed Watch Salmon Society.

Saleh, J.H. and Al-Muhktar ,M.A. (in Press).TheFirst study of using groundwater for common carp,*Cyprinus carpio*, breeding in the south of Iraq.

Suloma, A. and Ogata, H. Y. (2006). Future of Rice- Fish Culture, Desert Aquaculture and Feed Development in Africa: That case of Egypt as the leading Country in Africa. JARQ 40 (4), 351-360

استخدام المياه الجوفية في التكثير الاصطناعي لأسماك الكارب الشائع *Cyprinus carpio*

جاسم حميد صالح
مركز علوم البحار- جامعة البصرة

الخلاصة

أجريت دراسة مقارنة بين المياه الجوفية والمياه السطحية في التكاثر الاصطناعي لأسماك الكارب الشائع *Cyprinus carpio*، تبين من النتائج إن التكثير في المياه الجوفية يحصل في وقت مبكر تقدر بـ 45 يوم قبل التكثير الاصطناعي في المياه السطحية. وان درجة الحرارة في المياه الجوفية كانت 22م°. وكانت نسبة التفقيس في المياه الجوفية أعلى (85%) عما عليه في المياه السطحية.