Journal of Applied Biological Sciences 4 (3): 7-10, 2010
ISSN: 1307-1130, E-ISSN: 2146-0108 www.nobel.gen.tr

Spring Feeding Habits by Escaped Cage Rainbow trout, *Oncorhynchus mykiss* (Walbaum, 1792) in the Seyhan Dam Lake (Adana/Turkey)

Sibel ALAGÖZ ERGÜDEN* M. Ziya Lugal GOKSU Çisem ÇELİKKOL
*Cukurova University, Fisheries Faculty, Basic Science Department 01330 Balcali/Adana, TURKEY

*Corresponding Author
e-mail: alagozs@cu.edu.tr

Received : June 05, 2010
Accepted : September 21, 2010

Abstract

In this study were the stomach contents of 50 Rainbow trout were caught by gill nets in the Seyhan Dam Lake during the period from March-May 2007 and March-May 2008. Organisms, obtained upon analysing the stomach contents were counted to using method of IRI (Index of Relative Important). Percentages of food items consumed by trout were, in females 0.10% Fish, 6.90% Terrestrial Invertebrates, 17% Aquatic Invertebrates, 26% Microalgae and 50% of others including stones, wood, scales and egg while in males 0.20 % Fish, 5.27 % Terrestrial Invertebrates, 16.92% Aquatic Invertebrates, 19.90% Others (stone, wood, scale and egg) and 57.71% microalgae. In addition, 29 food items including 16 plant organisms, and 13 were animals were found in the stomach content of the rainbow trout.

Keywords: *Onchorhynchus* mykiss, Seyhan Dam Lake, index of Relative importance Diet composition

INTRODUCTION

Aquaculture has increasingly gained more important place in animal breeding. Culture of trout, particularly a cold water fish, is fulfilled in a number of countries in various environmental conditions. In Turkey trouts has been bred since 1967 as dominant species in cold water fish culture [1]. Rainbow trout is widely breed in not only pool and cage aquaculture in freshwaters but also cage aquaculture in marine water. In addition to being commercially cultured, *Onchorhynchus mykissis* also an invasive species, which is listed by IUCN (International Union for Conservation of Nature, IUCN) among the fastent invading 100 species across the world [2].

Although this species was first introduced to Seyhan Dam Lake so as to be breed in floating pools during winter months, it is considered to have escaped from cage the during transport.

Recently, There have been a number of studies on the dietary organisms of fishes included in the scope of aquatic culture in Turkey. This study is aimed at rainbow trout since it is both an exotic species and commercially breed. To this end, stomach content of the species in the Seyhan Dam Lake was examined with a view to provide data for any comparative study in the future.

MATERIALS and METHODS

Surface area of the Seyhan Dam Lake (37°03'38'' N; 35° 19'32''E) one of the main water reserves in the Mediterranean region, Turkey is 51.960.135 m^2, max depth 45 m in the spring, and the average altitude from the sea bed is 67 m. Included in mezotroph class, this lake is 10 °C, 15 °C and 23 °C during March, April and May respectively. Average temperature of the lake during the spring is 16 °C [3].

This study was conducted in the Seyhan Dam Lake in the spring from March 2007 to May 2007 and from March 2008 to May 2008. Stomach content of 50 rainbow trouts caught with gillnets of various mesh sizes (18x18mm, 24x24mm, 28x28mm, 32x32mm) were transferred to the laboratory in 4% formalin and the samples were examined according to the method which Ekingen [4] used.

In this study, out of totally 50 trout stomachs 46 were examined while, 4 were left unexamined since they were empty; these 46 fish had full stomachs, which contained both plant and animal organisms in their stomachs.

In order to determine grades of importance of the feed for the fish method of Relative Importance Index (IRI) was employed as in the following equation:

IRI=(V+N)x F, where
IRI: Index of relative importance
N: Numerical percentage of food item
F: Frequency percentage of food item
V: Percentage by volume

In addition, fullness ratio of trouts stomachess was calculated with the following equation:
D.Y= D.M.S/T.M.Sx100, where
D.Y: Fulness ratio
D.M.S: Number of full stomachs
T.M.S: Total number of stomachs
For the identification of organisms included in the stomachs, reference was made to Sheath and Wehr [5] , Merritt and Cummins [6].

RESULTS and DISCUSSION

It was determined that stomachs of the fish had certain plant organisms including Cyanophyta (Chroococcus and Spirulina), Bacillariophyta (Amphora, Cymbella, Melosira, Navicula, Amphipleura, Caloneis, and Asterionella), Chlorophyta (Botryococcus, Chlorella, Oocystis, Sphaerocystis, Pediastrum, Tetraedron and Coelastrum). In addition to aquatic invertebrates namely, Diptera (larvae (Chrinomus) and its pupa), Gastropoda, Copepoda (Cyclops sp), Cladocera (Bosmina sp), Ostrocoda, and Decapoda (Caridea) as well as insect from terreristrial invertebrates including Diptera (adult), Coleoptera, Formicidae, Hemiptera, Hymenoptera along Odonata with pike-perch, *Sander lucioperca* (Table 1).

Table 1. Food items determined in the trouts, stomach as well as their Relative Importance Index (IRI)

Stomach Content	**%IRI**	*Chironomidae(P)*	*2.37*
Micro Algae		**Mollusca**	
Cyanophyta (Cyanobacteria)		*Gastropoda (Physa sp.)*	*0.0001*
Chroococcus	*0.21*	**Crustacea**	
Spirulina	*0.07*	*Copepoda (Cyclops sp.)*	*1.33*
Bacillariophyta		*Clodocera (Bosmina sp.)*	*0.36*
Amphora	*0.55*	*Ostracoda*	*6.87*
Cymbella	*0.08*	*Decapoda(Caridea)*	*0.0001*
Melosira	*0.01*	**Terrestrial invertabrates**	
Navicula	*0.04*	*Diptera (Adult)*	*0.44*
Amphipleura	*1.67*	*Coleoptera*	*0.08*
Caloneis	*0.08*	*Formicidae*	*0.0001*
Asterionella	*0.08*	*Hemiptera*	*1.26*
Chlorophyta		*Hymenoptera*	*0.35*
Botryococcus	*0.87*	*Odonata*	*3.66*
Chlorella	*0.26*	**Fish**	
Oocystis	*2.48*	*Sander lucioperca*	*0.54*
Sphaerocystis	*4.84*	**Other**	
Pediastrum	*0.03*	*Egg (Culicidae)*	*10.1*
Tetraedron	*0.01*	*Scale*	*0.01*
Coelastrum	*0.03*	*Stone*	*0.03*
Aquatic invertebrates		*Wood etc.*	*0.08*
Diptera		*Digested Fish*	*0.11*
Chironomidae(L)	*61.1*		

A considerable part of females, stomachs 50% were filled with miscellaneous items such as stones, wood, scales and eggs while those of males had microalgae by 57.71% (Fig. 1 and 2).

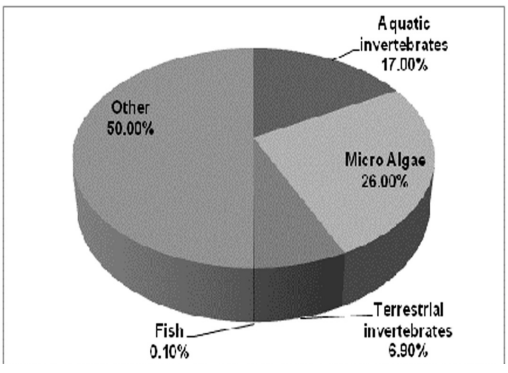

Figure 1. Percentage ratio of stomach contents of female trouts

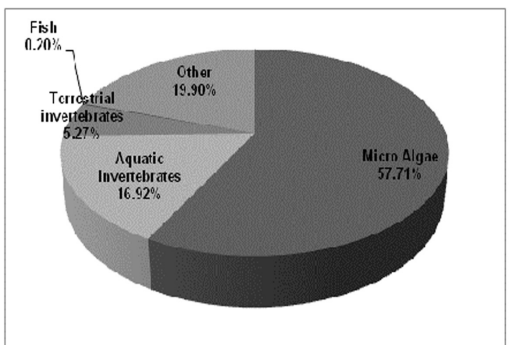

Figure 2. Percentage ratio of stomach contents of male trouts

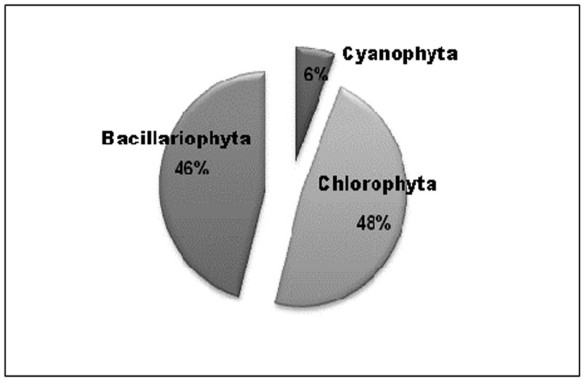

Figure 3. Percentage of plant food items of females

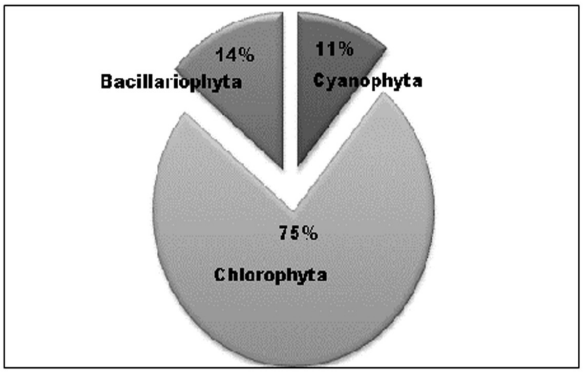

Figure 4. Percentage of plant food items of males

Chlorophyta group from plant items occured at high ratios in both males and females, its ratio was 48% and 75% of females and males respectively (Fig. 3 and 4).

When IRI values of the food items inluded in the trouts from the Seyhan Dam Lake were estimated according to Table 1, they were found from highest to the lowest as Chironomidae (L) 61.1 and Gastropoda, Decapoda and Formicidae 0.0001.

Similar food items as the stomach content is referred to in previous study aim at Urederra river, Spain [7], Lakes in America [8], rivers in Australia [9], Hawaii rivers [10], the Euphrates river [11].

Rikardsen and Sandring [12] point out that fullness ratio higher in April whereas this study refers to the highest fulness ratio in May. This difference between the fullness ratio periods may be due to different habitats conditions.

Table 2. Fulness ratio of stomachs of rainbow trouts in the Seyhan Dam Lake

Months	Number of Total Fish	Number of Full Stomach	Number of Empty Stomach	Fullness Status of Stomach	
				Full%	Empty%
March	10	8	2	80	20
April	16	14	2	88	12
May	24	24	0	100	0

Fig. 5 indicates that fulness ratio of the rainbow trouts in the Seyhan Dam Lake was higher in May than in March and April; fulness ratio is showed in Table 2.

The study reveals that stomachs included plant organisms, fish, aquatic and terrestrial invertebrates.

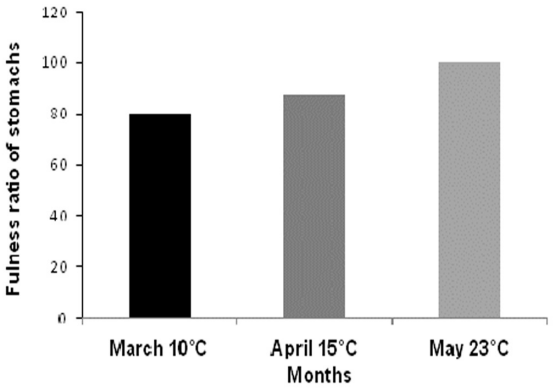

Figure 5. Fulness ratio of stomachs of rainbow trouts according to months

Angradi and Griffth [13] report in their study for the Snake river that 30% of stomach content of the trout onsisted of flament algae, most of the microalgae consumed by the trout in this study was comprised of the members of Chlorophyta.

Merz [14] reports in this study for Mokelumne river that aquatic invertebrates highest value the list of IRI by 92.8%. Present study is similar to that by Merz [14] IRI of aquatic invertebrates here is 72.04%. While Merz [14] refers to IRI for fish as 4%, the same ratio 0.5% in our study. This differences is considered to result from the size of fish and the number of samples.

Despite the fact that the rainbow trout inhabiting the Seyhan Dam Lake is carnivores by nature, it can well feed on plant organisms. Furthermore, it was determined by this study that those trouts escaping from the pools could adapt to feeding circumstance in the natural conditions of the Seyhan Dam Lake.

REFERENCES

[1] Emre Y, Kürüm V. 2007. Havuz ve Kafeslerde Alabalık Yetiştiriciliği, ikinci baskı, 272 s, Pak Ajans, İstanbul.

[2] Kitano, S. 2004. Ecological impacts of Rainbow, Brown and Brook Trout in Japanese Inland Waters. Global Environmental Research. 8(1): 41-50.

[3] Çevik F, Derici BO, Koyuncu N, Tugyan C. 2007. Water quality and its relation with Chlorophyll-a in dry season, in a reservoir of Mediterranean region. Asian Journal of Chemistry. 19: 2928- 2934.

[4] Ekingen G. 1978. Munzur çayı alabalığının (S. trutta labra Pall.) Doğal Beslenme Olanakları. Doçentlik Tezi. Fırat Üniversitesi Veteriner Fakültesi Su Ürünleri, Balıkçılık ve Av Hayvanları Kürsüsü, p 87, Elazığ.

[5] Sheath RG, Wehr JD. 2003. Freshwater Algae of North America: Ecology and Classification. p 918. Academic Press, San Diego, CA.

[6] Merritt RW, Cummins KW. 1996. An introduction to the aquatic insects of North America. p 862. Kendall-Hunt Publishing, Dubuque, Iowa.

[7] Oscoz J, Leunda PM, Campos F, Escala MC, García-Fresca C, Miranda R. 2005. Spring diet composition of Rainbow Trout, *Oncorhynchus mykiss* (Walbaum,1792) in the Urederra River (Spain). Anneles de Limnologie - International Journal of Limnology. 41(1): 27-34.

[8] Rabe FW. 1967. Age and growth of rainbow trout in four alpine lakes. Northwest Science 41: 12-22.

[9] Pidgeon RWJ. 1981. Diet and growth of rainbow trout, Salmo gairdneri Richardson, in two streams on the New England Tableland New South Wales. Australian Journal of Marine Freshwater Research. 32: 967-974.

[10] Kido MH, Heacock DE, Asquith A. 1999. Alien rainbow trout (*Oncorhynchus mykiss*) (Salmoniformes: Salmonidae) diet in Hawaiian streams. Pacific Scientific. 53: 242-251.

[11] Çakmak NM, Şen D, Çalta M, Pala G, Aydın R, Ural ŞM. 2002. Fırat Nehri'nde Yaşayan Gökkuşağı Alabalığı (*Oncorhynchus mykiss,*Walbaum 1792)'nın Mide İçeriği. F. Ü. Fen ve Mühendislik Bilimleri Dergisi. 14(1): 217-223.

[12] Rikardsen AH, Sandring S. 2006. Diet and size-selective feeding by escaped hatchery rainbow trout *Oncorhynchus mykiss* (Walbaum). ICES Journal of Marine Science. 63: 460-465.

[13] Angradi TR, Griffith JS. 1990. Diel feeding chronology and diet selection of rainbow trout (*Oncorhynchus mykiss*) in the Henry's Fork of the Snake River, Idaho. Canadian Journal Fisheries Aquatic Science. 47: 199-209.

[14] Merz JE. 2002. Seasonal feeding habits, growth, and movement of Steelhead Trout in the Lower Mokelumne River, California. California Fish and Game. 88(3): 95-111.