RECONSTITUTION OF TENCH NATURAL POPULATIONS (TINCA TINCA) BY APPLICATION OF LABORATORY SPAWNING

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REKONSTITUCIJA PRIRODNIH POPULACIJA LINJAKA (*TINCA TINCA*) PRIMENOM LABORATORIJSKOG MRESTA

Abstract

Linjak je jedina vrsta iz roda Tinca i živi u vodama Europe i Sibira do 61^0 sgš. Najčešće se sreće u manjim plitkim vodenim bazenima sa muljevitim dnom, prosečne dubine do 2 m, koji su dobro zagrejani preko leta i bogato obrasli vodenom vegetacijom. Aktuelna sistematska istraživanja ihtiofaune i ribljeg fonda brojnih, za linjaka, tipičnih hidroekosistema, ukazuju na njegovo sporadično prisustvo. Na osnovu analize brojnosti i gustine populacija u raznim tipovima stajaćih i tekućih voda, prirodnim i rečnim jezerima, akumulacijama, kanalskoj mreži hidroistema Dunav-Tisa-Dunav, kao i rekama i njihovim plavnim zonama ustanovljen je zvanični status kao nizak-LR (lc). Istovremeno, u Evropi se nalazi u kategoriji „intermediate", ali vrlo lako može biti prebačen u kategotije „redak" ili ranjiv", ako se nastavi sa devastacijom staništa. Na osnovu probnih lovova utvrđeno je individualno učešće u ukupnom ulovu na pojedinim lokacijama kanala HsDTD u Bačkoj i Banatu od 0.22 do 18%, dok je maseni udeo iznosio od 0.16 do 24%. U pojedinim rečnim sistemima Dunava, Tise, Save i Tamiša (obalni region, stara korita i plavna zona) brojni udeo linjaka se kreće od 0.37 do 25%, a težinski iznosi 1.2-17.3%. Tench are found in very small numbers in our waters. Sadašnja proizvodnja linjaka u toplovodnim ribnjacima Srbije je zanemarljiva, iako je u prvoj polovini prošlog veka ona bila na drugom mestu, odmah iza šarana.

U cilju uvećavanja brojnosti i gustina populacija linjaka sproveden je laboratorijski mrest matica odabranih iz divljih populacija na osnovu habitusa. Ženke su bile starosti 2-4 godine i težine od 400-1500 g. a mužjaci su imali tri godine i telesnu masu 250-700 g. Hranjeni su u dnevnoj količina 1-3 % u odnosu na ukupnu težinu. Hormonalna stimulacija izvedena je „kobarelinom", sintetičkim preparatom LH-RH (5 mg/kg) i jednokratnom hipofizacijom pri temperaturi vode 21-22 ^{0}C. Mešanje ikre i mleča se obavlja u odnosu 100g : 0,4 ml uz postupak odlepljivanja pomoću alkalaze. Do izvaljivanja, pri temperaturi 20-22^{0}C, došlo je za 126^0 časova. Procenat oplođenja je iznosio 90%.

Izvaljene predlarve su prebačene u ležnice i posle 6-7 dana, pri temperaturi vode od 20^{0}C, razvile su se larve, sposobne za samostalnu ishranu u rastilištima i mladičnjacima, gde se gaje u mono- ili polikulturi (sa šaranom). U monokulturi (bez prelova) nasađuje se 100.000–400.000 kom/ha i na kraju sezone narastu 3-10g u zavisnosti od gustine nasada (gušći – 50.000-80.000, a ređi 30.000-50.000). U objektima sa prelovom nasađuje se 300.000-2.000.000 kom/ha. Preživljavanje se kreće 5-30%. Kod poluintenzivnog gajenja, u polikulturi sa šaranom, dobijen je prinos 300 kg/ha. Prezimljavanje jednogodišnjih mladunaca je sprovedeno u istom objektu, a nastavak gajenja je obavljen po ekstenzivnim principima uz dodavanje ugorelog stajnjaka (6000 kg/ha). Masa linjaka na kraju druge godine proizvodnje se kretala 60-120 g, a ukupna proizvodnja je iznosila 800 kg/ha dvogodišnjih riba uz utrošak kompletnih hraniva (25% sirovih proteina biljnog porekla i pivski kvasac) od 600 kg. Paralelno sa laboratirijskim, organizovan je i prirodni mrest u objektu od 0.2 ha optimalno obraslom vodenom vegetacijom, sa 5 matica.

Dobijeni dvogodišnji mladunci se koriste za poribljavanje otvorenih voda kao uspešna alternacija mrestu u prirodnim plodištima.

Ključne reči: *linjak, rekonstitucija, mrest, otvorene vode*

INTRODUCTION

Tench is the only species of the genus with the same name, which is widespread in the waters of Europe and Siberia (up to 61 north latitude), with the exception of Iceland, most of northern Scotland, Scandinavia, the Balkans of the Adriatic basin, Greece and Crimea. Tinca genus differs from other genera of Cyprinidae family and do not have close relative in the recent fish fauna (Brylinska et al. 1999). According to studies of genetic variation and differentiation of natural and ponds populations it is open the possibility that there are two kinds of tench in Europe, and it is necessary to protect their genetic resources (Kohlmann et al. 2008, Lajbner et al. 2008).

In the middle of last century tench was very populated in all types of standing and slow running waters, including warm-water pond where in the total production tench occupied the second place, immediately after the carp (Ćirković et al., 2008, 2009, 2010). However, due to increased hydro meliorative clutches, disorders of the hydrological regime and water quality deterioration during the recent decades, there was a loss of large complex of flood zone which is tench typical habitat what resulting in a drastic reduction of its population (Maletin et al, 2008a, b).

During the last few decades, by continuous monitoring of fish stocks of different types of aquatic ecosystems, especially the characteristic habitats of tench (flooded areas of big and small rivers, canals, hydro DTD, lakes and reservoirs) it was affirm a drastic reduction in the number and size of populations in time and

space (Markovic et, 2008, 2010, Simic et al., 2010; Maletin et al., 2010). Among the main reasons for the reduction of flood zones are the deterioration of water quality and the negative impact of imported fish species (Lenhardt et al., 2010).

In order to increase the number and density of natural populations it is necessary to organize reproduction in the laboratory which includes the selection of parent materials, spawning and rearing of larvae and fingerlings which use for stocking of adequate hydroecosystems.

MATERIAL AND METHODS

By using different types of fishing gear (nets and electrofishing) and based on the evidence of sport fishermen it was ascertain the dynamic of changes with the tendency to reduce the number and density of populations in the typical habitats (flooded areas, canals Danube-Tisa-Danube, lakes and artificial reservoirs).

Artificial spawning of tench was conducted on hatcheries in the Trebon region in the Czech Republic and the experimental hatchery of Faculty of Science in Kragujevac. Selected females (average weight of 1000 g) originated from natural populations of reservoir Ćelije, were anesthetized by solution of 2 - phenoxyethanol (0.2 ml / l) and stimulated with the synthetic hormone (GnRH - 18-20 mg and dopamine-antagonists metoclopramide - 8-10 mg) at water temperature of 18-22 ° C. Breeding of larvae, one and two years old tench fingerlings was conducted at the experimental pond »Ribarska zadruga Mošorin« during the 2009 and 2010.

RESULTS AND DISCUSION

Conducting systematic surveys of ichthyofauna and fish in different types of aquatic ecosystem it was ascertain sporadic presence of tench in typical habitats inhabited by this species - river flood zones, natural and rivers reservoirs and canals, HsDTD. The river flows the Danube, Tisa, Tamiš and Sava with their flood zones are important habitats of tench. However, the density of population in these biotopes was very modest (0.37 - 1.2%.). The exception is Zasavica (the former bed of the river Sava) where the the individual and biomass presence of the tench amount 3.93-25%, and 6.91-17.3% respectively. In the lake Palic and Ludoš, especially in anthropogenic reservoirs, such as Zobnatica, Borkovac, especially Vlasina, tench populations are held by periodic stocking. In some channels of Backa and Banat parts of Hs DTD was noted sporadic presence of tench with the participation of 1-2% of the total catch. Exceptions are the oldest and purest shares where the share of tench can be over 10% (Maletin et al, 2008c). For laboratory spawning females were selected from wild populations according to habitus, females were 2-4 years of age and weighing 400-1500 g. and males with three years of age and weighing 250-700 g, were fed daily in amount of 1-3% in relation to body mass. Hatched pre-larvae were transferred to sieve-cloth boxes after 6-7 days, at water temperature of 20°C. Larvae were developed and capable of independent feeding in the nursery area and ponds where are grown in mono or polyculture (the carp). In monoculture (no overfishing) is stocked 100.000-400.000 units / ha and at the end of the season fish grow 3-10 g depending on the density of plantation (denser – 50.000-80.000 and less denser 30.000-50.000). In the facilities assigned for overfishing can be stocked 300.000-2.000.000 units / ha. Survival ranging 5-30%. Rearing in semiintensive system in polyculture with carp, resulted in the yield of 300 kg / ha. Overwintering of one year old tench fingerlings was conducted in the same pond.

Growing is continued according to extensive principles using mature manure (6000 kg / ha). The mass of tench at the end of the second year of production was 60-120 g, and total production was 800 kg / ha of fish with the consumption of 600 kg of complete feed (25% crude protein of vegetable origin and brewer's yeast). In parallel with laboratory was organized and natural spawning in the space of 0.2 ha covered with optimal emersal, submerged and floating vegetation. It was conducted by releasing five fish (2 females and 3 males) with the implementation of preventive measures and veterinary supervision (ectoparasites, wild fish, birds and minimum of stress).

Tench is a species of fish grown in aquaculture of several European countries (Steffens, 1995), mostly semi-intensive in polyculture with the cyprinid species. Besides Europe tench production increased dramatically in China since year 1998 (Wang et al. 2004). In order to perform adequately reconstitution of tench natural populations, which would have increased their number and density, it is necessary to master its controlled spawn in our best equipped hatcheries. Environmental conditions should be adjusted in accordance with literature data and knowledge in the technological processes of carp production. It is necessary to aspire how to balance the use of the natural capacity of the habitat in our environment and production where chemical substances are not in use. Thus the production of tench in our country would represent organic production and food which is safety for human consumption.

CONCLUSION

It was organized the artificial spawning of tench with the aim of increasing its populations in natural waters. Successful laboratory spawning was carried out thanks to quality parent materials. Larvae and one year old fingerlings were cultivated in semi-intensive system while two years old fingerlings were reared in extensive system. As feed were used pellets with 25% crude protein of vegetable origin and brewer's yeast. Yield for the first year amounted up to 300 kg / ha and in second year 800 kg / ha (with spent of 600 kg of food). Produced two-year old fingerlings can be used for stocking of open waters as successfully alternation of spawn in the natural places.

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