# IMPROVEMENT OF REARING CONDITIONS FOR JUVENILE PIKEPERCH (*SANDER LUCIOPERCA*) PRODUCTION IN RAS.

T. Colchen*[1], Y. Ledoré[1], S. Hmilla[1], E. Gisbert[2], D. Zarski[1], A. Pasquet[1†] and P. Fontaine[1].

[1] University of Lorraine, UR AFPA, USC INRA 340, Vandoeuvre les Nancy, F-54506 - France.
[2] IRTA - Sant Carles de la Ràpita, Crta Poble Nou km 5.5, 43540 Sant Carles de la Ràpita (Spain)
† CNRS: National Centre for Scientific Research – France
Email: p.fontaine@univ-lorraine.fr

## Introduction

Pikeperch has gained attention as a promising new species in intensive fish farming (Nyina-wamwiza et al. 2005) with a great economic potential (Kestemont et al., 2015). Until now several bottlenecks have prevented the success of larval rearing. Three major bottlenecks have been identified: (1) a high mortality mainly due to cannibalism, (2) a high occurrence of skeletal deformities and (3) a large size heterogeneity between larval cohorts at various ontogenic development stages. As consequence pikeperch larval rearing is related to very variable performances with a low rate of success. In fact, a larval rearing system is complex and numerous factors influence larval development as well as behavior and survival (Kestemont et al., 2003). These factors can be gathered in three groups: environmental, nutritional and populational factors. This complexity explains the important diversity observed in the different larval rearing protocols used (Hamza et al., 2007, 2012; Szkudlarek and Zakes 2007; Lund and Steenfeldt, 2011; Ljubobratović et al., 2015; Król and Zakęś, 2016). Such variability is also present in farm conditions. In order to standardize the protocol for larval rearing taking into account the complexity of this biological process, the use of multifactorial approaches appears particularly adapted to determine the optimal combination of factors (Gardeur et al., 2007), which could give the best growth, survival and development of pikeperch larvae over the nursery period.

## Materials and methods

Three successive experiments were conducted over the period 2015-2017 to study the effects of the major environmental, nutritional and populational factors. For each trial, pikeperch larvae were supplied after hatching by the SARL Asialor (France) and distributed in eight tanks (700 L) from an indoor water recirculated system. During the first experiment, four environmental factors were tested: light intensity (5 and 50 lx); water renewal rate (water renewal rates of 50 or 100% per hour); water current direction in the tank (up-flow or down-flow) and cleaning done at two different periods of times (in the morning, just after the first feeding or in the evening before the last feeding of the day). During the second experiment, four nutritional factors were studied: beginning of weaning (10 days or 16 days post-hatching, dph), method of food distribution (discontinuous feeding with 7 meals day$^{-1}$ or continuous feeding over the lighting period), co-feeding (implementing or not a co-feeding, 3.5 g day$^{-1}$ 6 days before the weaning period, Larviva Pro-wean, BioMar) and weaning duration (3 or 9 days). The third experiment concerned four populational factors: initial larvae density (50 or 100 larvae L$^{-1}$), sorting out fish jumpers (yes or no), sibling or not sibling populations (one spawn or mixed of two spawns hatched the same day) and female weight (2.5 kg or 3.3 kg). A fractional factorial experimental design ($2^{4-1}$) of resolution IV was used for each experiment to study simultaneously the effects of these four factors and their possible interactions. For all experiments, photoperiod was fixed: 12h of light and 12h of darkness (Hamza et al., 2007) with a progressive increase of light intensity (from 0 to 5 or 0 to 50 lx) from 7:30 to 8:00 am and a decrease of light intensity (from 50 or 5 to 0 lx) from 8:00 to 8:30 pm. Water temperature was maintained at 20°C in all tanks (Kestemont et al., 2007; Szkudlarek and Zakes, 2007). Dissolved oxygen was maintained above 6 mg L-1. Every week, from four days post hatching (dph), larvae were sampled in each tank. Total length and body weight were measured.

## Results

Considering the environmental factors, we recommend to apply a light intensity of 50 lx, a water renewal rate of 100%, cleaning of the tank during the afternoon and an inlet of the water at the bottom level. The second experiment showed that a later onset and longer duration of weaning followed by discontinuous feeding improve larval survival, growth and reduce skeletal deformities in pikeperch populations. The third experiment suggests an improvement of juvenile pikeperch production using initial high larvae density supplied by large females.

## Discussion and conclusion

Progressively the rearing protocol for pikeperch larval rearing was improved, and an optimal combination of factors was determined. It allows the production of 5000 juveniles (1.0-1.4 g, 50 dph) per tank with swim bladder inflation rate of 90-95%.

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