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Contribution to the study of maturation and spawning problems of the sharpnose seabream (*Puntazzo puntazzo*)

G. GEORGIU
D. STEPHANOU
DEPARTMENT OF FISHERIES
13 AELOU STR
NICOSIA
CYPRUS

SUMMARY - The culture of *Puntazzo puntazzo* began in Cyprus in 1988. Both its culture and market potential were found to be very promising and was soon adopted by commercial fish farms for rearing. Broodstock, however, often either fail to spawn or their spawning is erratic, giving small quantities or poor quality eggs if water temperature is not favourable. In 1991 at the Meneou Experimental Marine Aquaculture Station spawning started early due to a sudden drop of ambient seawater temperature. When the temperature went up again to normal levels, the females kept hydrating resulting to loss of about 75% of the female broodstock population. Similar problems appeared at the Meneou Station in 1992, 1993 but also in private commercial hatcheries. The female broodstock of *P. puntazzo*, a hermaphrodite species with the reproduction characteristics of a sequential spawner, after developing the oocyte, failed to spawn. Induced spawning using HCG and a gonadotropin-releasing hormone, did not give any positive results. Further research on the reproduction of this species is needed.

Key words. *Puntazzo puntazzo*, Aquaculture, Reproduction, Cyprus, Species diversification.

RESUME - "Contribution à l'étude des problèmes de maturation et de ponte du sar à museau pointu (*Puntazzo puntazzo*)". L'élevage de *Puntazzo puntazzo* a commencé à Chypre en 1988. Cet élevage ainsi que son potentiel de marché s'avéraient très prometteurs et il fut vite adopté par les fermes piscicoles commerciales. Cependant les reproductrices souvent ne parvenant pas à pondre ou bien la ponte étant erratique, on a obtenu des oeufs en petites quantités ou bien de mauvaise qualité lorsque la température de l'eau n'était pas favorable. En 1991 à la Station Expérimentale d'Aquaculture Marine de Ménéou, la ponte avait commencé tôt en raison d'une baisse soudaine de la température ambiante de l'eau de mer. Lorsque la température remonta à nouveau jusqu'à un niveau normal, les femelles continuèrent de s'hydrater, ce qui entraîna une perte d'environ 75% de la population de reproductrices. Des problèmes de même ordre ont été enregistrés à la Station de Ménéou en 1992, en 1993, et également dans des écloséries du secteur privé. Les reproductrices de *P. puntazzo*, qui est une espèce hermaphrodite présentant les caractéristiques de reproduction d'une ponte séquentielle, ne parvinrent pas à pondre après le développement de l'ovocyte. La ponte induite en utilisant de l'HCG et une hormone de sécrétion de gonadotropine, n'a pas donné de résultats positifs. Des recherches sont encore nécessaires sur la reproduction de cette espèce.

Mots-clés : *Puntazzo puntazzo*, Aquaculture, Reproduction, Chypre, Diversification des espèces.

INTRODUCTION

Within the framework of diversification *Puntazzo puntazzo* was cultured for the first time on an experimental basis in Cyprus in 1988. These experiments started with the collection of wild fish for the formation of broodstock. Spawning and larval rearing of *P. puntazzo* was managed successfully at the Meneou Experimental Marine Aquaculture Station of the Department of Fisheries by Stephanou and Georgiou (1991). Encouraging results on the culture of this species were received earlier by Divanach and Kentouri (1982), who cultured it on an extensive scale and by Franicevic (1989), who investigated the possibility of the intensive culture of *P. puntazzo* larvae.

The larval rearing did not present any major or unsurpassed difficulties. The growth rate at the prefattening and the fattening stage is similar to that of the gilthead bream and slightly better than that of seabass. The market potential was found to be very promising, a factor which also played a decisive role in the fast adoption of its culture by the commercial fish farms.

The wholesale price of *P. puntazzo* today in Cyprus is US\$ 14.00/kg compared with US\$12.00/kg which is the wholesale price of *Sparus auratus*. The demand for fry is also high, both for the local market and for export.

One of the most important factors in fish farming is the control of the spawning pattern of the species under culture, in order to have synchronised and good quality egg production for the constant supply of fry to the fattening farms. This is not the case of *P. puntazzo*. Often *P. puntazzo* broodstock, a hermaphrodite species with the reproduction characteristics of a sequential spawner, fail to spawn, either spontaneously or by induction. In addition to Cyprus, this occurs in other Mediterranean countries as well, like Greece, Italy, Morocco.

BROODSTOCK REARING

The broodstock of the Meneou Experimental Marine Aquaculture Station is reared in 10m³ outdoor shaded round fiberglass tanks, with an open water system and, sometimes, in a small sea cage. In that case the fish are transferred to the Station before spawning.

The stocking density in the tanks, during the rearing phase, is 3-3.5kg/m³. Nutrition consists of inert commercial broodstock diets supplemented with fresh fish and squid. The fish behaviour is normal and no rearing problems of any kind are faced.

BROODSTOCK MATURATION AND SPAWNING PROBLEMS

The natural spawning period of *P. puntazzo* in Cyprus occurs from the end of October to the end of December. It was observed that when the water temperature drops to 21°C the females start spawning. Spawning is sequential and takes place at the same period of the day, usually around midday.

In 1990, when the experimental larval culture was initially undertaken, the broodstock was reared in cages and was transferred to the experimental station about a month before spawning. Broodstock spawning was spontaneous and the eggs were of high quality. The fish kept spawning daily for about two months, giving small quantities of eggs but of excellent quality.

In 1991 spawning at the Meneou Station started early, towards the end of September, due to a sudden drop of the ambient seawater temperature from 25°C to 20°C. A small quantity of eggs was received before the temperature increased again to the normal 25°C and the broodstock stopped spawning. The females, however, kept hydrating, resulting to death of about 75% of the female population. It was the same broodstock which gave good eggs the year before, plus some more which were collected from the wild.

The same problem appeared again in 1992 when the females failed to spawn, although they had developed their oocytes in October. Stripping gave eggs of very poor quality or completely bad.

In 1992, 1993 and 1994 the broodstock was reared in cages and they were transferred to the Station 3-4 weeks before the expected spawning time. The results, however, were the same as in previous years: the broodstock either did not spawn at all or gave few eggs. Some overhydrated females died since they did not manage to reabsorb their eggs. The same problem was faced in private commercial hatcheries during the last two years, resulting to smaller fry production.

In an attempt to avoid the problem in 1991 and in 1992, female *P. puntazzo* were injected with human chorionic gonadotropin (HCG), at the dose of 1000 IU/kg body weight. This, however, did not give any positive results. The females, even though they underwent hydration, failed to spawn. Most of them did not reabsorb their eggs and died.

In the third week of October 1992, after biopsy and measurement of the oocyte, which was found to be 500µ. three broodstock groups were formed. In addition, a control group with the same number of males and females was formed. Each one was composed of 5 females and 10 males. All fish of the three groups were injected with a gonadotropin releasing hormone, at the dose of 5µg/kg, 7µg/kg and 10µg/kg of body weight.

All groups were reared under exactly the same conditions and were placed to spawn also under the same conditions and parameters. Neither group gave any positive results. Some fish in the high dose group hydrated, but again no spawning occurred. Ten days after the first injection, the fish were injected again with the same dose despite of the fact that they showed signs of undergoing atresia. The second injection did not give any positive results either. All groups, including the control, failed to spawn.

Since it was observed that the temperature plays a predominant factor in the spawning of this species, temperature shocks were used to induce *P. puntazzo* broodstock to spawn. In 1991 and 1992, when the spawning was interrupted due to the increase of

the water temperature, several attempts were made by dropping the water temperature down to the desired level of 21°C, however, again without any results. The females did not resume spawning again when the temperature came back to the normal, once the spontaneous spawning was interrupted.

CONCLUSION AND DISCUSSION

Obviously we still do not understand the physiology of reproduction of this fish and what exactly triggers spawning. More research work is needed on this topic. Light intensity and photoperiod, although important, do not seem to play, alone, the decisive role in the spawning of *P. puntazzo*. Its spawning temperature range seems to be very narrow, about 19°C-21°C. Vital role to the start of spawning seems to play to the water temperature. Further examination of the role of the environmental parameters in the spawning of *P. puntazzo* are needed before concrete conclusions could be reached and the constraints inhibiting the mass production of this species in hatcheries be overcome.

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