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FECUNDITY OF *CHANNA PUNCTATUS*

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The size of ova increases considerably in length and width of the ovary as it attains maturity. The maximum fecundity of ovary in stage III indicates that number of ova added to ovary during the immature and maturing stages. There exists a definite relationship between GSI and fecundity *i.e.* an increase in fecundity causes increase in GSI. Simultaneously, in some ovary the reduction of ova number takes place due to less availability of food.

INTRODUCTION

The fecundity of fish may be defined as the number of eggs that are likely to be laid during spawning season. A knowledge of fecundity and its relation to the size of the fish makes it possible to estimate the number of eggs likely to be liberated. In fish cultural and breeding management programme if the number of eggs likely to be obtained by spawning stock is known, it is easier to make arrangement for their successful hatching. In capture fisheries, however, the fecundity and ova size relationship is useful of in estimating the number of spawners in fish stock. Considerable studies on the fecundity have been done in India by Bagenal (1969), Varghese (1973), Pathani (1981), Rishi & Kaul (1982), Piska & Waghray (1986) whilst other important workers from abroad are Almatar & Bailey (1989), Mayer *et al.* (1990), Lowerre *et al.* (1993), Neja (1993), Tachihara *et al.* (1993), Zivkov & Petrova (1993), Kjesbu & Holm (1994), Elliot (1995), Koslow *et al.* (1995) and Tryle *et al.* (1996).

MATERIALS AND METHODS

For fecundity studies, sample weight (ovary) was taken in fresh condition. At the time of work they were taken out of 50% formalin, and boiled in fresh water for about 10 minutes. This unabled the breakdown of the ovarian tissues considerably, and ova were free from the covering membrane. The eggs were boiled again in freshwater for about 5 minutes, and they were completely liberated from the ovigerous lamellae after a few vigrous shakes with water in a tube. When the ova had settled down the supernatent water was discarded. The washed eggs were transferred on a blotting paper and air dried for 15-30 minutes, when the remaining membrane and connecting tissues were removed by a forceps. The entire mass of the ova was weighed. Out of total mass, 100 mg of ovarian mass was taken up for study of two samples of 20 mg each out of this stock, the number of ova in each sample was counted separately under binocular microscope, and the total number of ovarian eggs was estimated by the formula :

$$F = \frac{W}{W_1 + W_2} (N_1 + N_2)$$

where F = Fecundity, W = Weight of the total ova, W_1 and W_2 are weights of samples one and two, N_1 and N_2 the number of ova present in samples one and two. The G.S.I. was also calculated during different stages of the maturation.

$$\text{G.S.I.} = \frac{\text{Weight of the ovary}}{\text{Weight of the fish}} \times 100$$

Table I : Average of fecundity during different stages of *Channa punctatus* (Bl.).

Immature stage (I)	Maturing stage (II)	Mature stage (III)		Spent stage (IV)	Range of stage I	Range of stage II	Range of stage III	Matured stage II in scarcity of food
3306	8068	9210	9296	10				6968
3320	8046	9218	9782	eggs	3200			6900
3200	8162	9626	9816	are	3482			6888
3282	8126	9694		degene-				6940
3346	8176	9726	9374	rating			9210	6842
3470	8272	9788	9432	20		8046		6928
3340	8284	9698	9778	and		8400	10426	6948
3378	8172	9878	9808	ruptured				6866
3296	8268	9428	9280					6848
3482	8326	9874	9998				6968	6908
3428	8248	9940						6912
3468	8264	9864	10264				-6842	6928
3390	8262	9978						6852
3460	8322	10426	9468					
3240	8400	10128	9848					6874
3262	8396	10348	9912					
Range 3200-3482	Range 8046-8400	Range 9210-10426						6968-6842

RESULTS AND DISCUSSION

In the present study a linear relationship between body length and ovary measurements was established and similar relationship was also observed by Varghese (1973). Hancock (1979) found that large fish spawned bigger eggs than small fish and ovary weight linearly related with somatic weight.

During the present investigation bigger eggs from bigger fish are recorded. Heavier ovary contained proportionately larger ripening eggs than small ovaries. Rishi & Kaul (1982) also noted that the fecundity and ovary weight has been found to be related to ratio of body weight and gonad weight linearly. This signifies that the number of eggs increases in proportion to the body weight and gonad weight. Bagenal (1969), however, found a non-linear relationship between fecundity and gonad weight, though there was a linear relationship between fecundity and body weight. During present study it is found that in 65% fishes the fecundity increases linearly with fish length, weight; ovary length, width and weight; ova size and G.S.I. But in 35% fishes there is reduction in fecundity with the attainment of maturity (Table I) while G.S.I. shows no difference. Sudha (2002) noted fall in G.S.I. is consequent to spawning. The pattern of change in G.S.I. over the seasons, it was also observed that committance of G.S.I. and rainfall synchronised the ovarian maturation and spawning. In the present study G.S.I. fell down in spent stage of ovarian cycle and maximum in matured/spawning stage III (Table I). This is due to the presence of water with fluid inside the ovary and decrease in fecundity is due to less availability of food to the fish. To compensate the food some ova were utilized as food. This causes a reduction in fecundity. These experimental results are in agreement with Bagenal (1969). Bagenal (1969) noted that well fed females have high fecundity and produce more eggs while Hislop *et al.* (1978) stated that the food energy supplied to the low ration fish was apparently not sufficient to satisfy fully the requirements of both (somatic growth *i.e.* increase in body weight and reproduction). Spawning took place, although at a reduced level and the weight of somatic tissue fell down. It appears when a balance is reached, spawning is not postponed in order to conserve all energy for somatic growth but on the other hand the somatic tissues were not depleted to a potentially lethal level in order to maintain fecundity at the level of average fish, handock *Melanogrammus apglefinus* (L.). Pathani (1981) also observed late maturation of *Tor putitora* due to low temperature and less food. Piska & Waghray (1986) noted linear relationship fecundity and length, weight similar results are observed in 65% of fishes.

Similar results were also noted by Walser (1993) and Zivkov & Petrova (1993). Walser (1993) reported that the maternal body weight, egg mass (weight and age of fish egg mass) were linearly correlated in *Ictalurus punctatus*. Zivkov (1993) also established a correlation between fecundity and length and age of the fish *Stizostedion lucioperca* in different water bodies in their geographical areas, morphology and ecology. Xu *et al.* (1994) also confirm that the diet play an important role in improving the fecundity in prawn while Nega (1993) and Elliot (1995) noted that the gonadal development depends on fish length, because bigger fish and males matured more rapidly. He correlated significantly with fish length, weight and age. The relationship of fecundity with length was curvilinear (parabolic) while relationships of fecundity with weight and age were close to linear. Ohya *et al.* (1994) recorded that the fecundity and mean egg weight increased as body weight exceeded 400 gm in amago salmon (*Onctorhynchus nasou ishikawae*)

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REFERENCES

ALMATAR, S.M. & BAILEY, R.S. 1989. Variation in fecundity and egg weight of herring *Clupea herrengus* (L.). *J. Cons. Int. Explorer*. **45**(2) : 113-124.

BAGENAL, T.S. 1969. The relationship between food supply and fecundity in brown trout *Salmo trutta* (L.). *J. Fish. Biol.* **1** : 167-182.

HANCOCK, R.S. 1979. The annual cycle of intraovarian egg size and fecundity of *Barbus barbus* in river Severn U.K. *Freshwat. Biol.* **79**(B) : 535-542.

HISLOP, J.R.G., RABB, A.P. & GAULD, J.A. 1978. Observations on effects of feeding level on growth and reproduction, *Melanogrammus aeglefinus* (L.) in captivity. *J. Fish. Biol.* **13**(1) : 85-98.

ELLIOT, J.M. 1995. Fecundity and egg density in nedd for sea trout. *J. Fish. Biol.* **47**(5) : 893-901.

JANDE, P.V. & JADHAV, P.G. 1993. Study on fecundity of a teleost fish *Chanda ranga*. Biovigyanam. **19**(1-2) : 92-95.

KJESBU, O.S. & HOLMS, J.C. 1994. Oocyte requirement in first time spawning Atlantic cod (*Gadus morhua*) in relationa to feeding regime. **51**(18) : 1893-1998.

KOSLOW, J.A., BELL, J., VIRTUE, P. & SMITH, D.C. 1995. Fecundity and its variability in orange roughly, effects of population density condition, egg size and senescence. *J. Fish. Biol.* **47** : 1063-1080.

LOWERRE-BARBIERI, S.K. & BARBIERI, L.R. 1993. A new method of oocyte separation and preservation for fish reproduction studies. *Fish. Bull.* **91**(1) : 165-170.

MAYER, I., SHACHLEY, S.E. & WITHAMES, P.R. 1990. Aspects of reproductive biology of bass *Dicentrarchus labrax* (L.) II. Fecundity and pattern of oocyte development. *J. Fish. Biol.* **36** : 141-148.

MILTON, D.A., BLABER, S.J.M. & RAWLINSON, N.J.F. 1995. Fecundity and egg production of four species of short lived clupeiod from Solomon Island tropical south Pacific. *ICES. J. Mar. Sci.* **52**(1) : 111-125.

NEJA, Z. 1993. Maturation and fecundity of mackerel (*Scomber scombrus* L.) in northwest Atlantic. *Acta Ichthyologica et Piscatoria*. **23**(2) : 125-140.

OHJA, S. SHIMIZU, T., HORIKAWA, Y. & YAMOTO, S.I. 1994. Suitable body size of salmon used as brood stock. *Mem. Fac. Agri. Kinki Univ.* No. **27**, pp. 25-30.

PATHANI, S.S.S. 1981. Fecundity of Mahasheer. *Proc. Indian Acad. Sci.* (*Anim. Sci.*). **90**(2) : 253-260.

PISKA, R.S. & WAGHRAY, S. 1986. A note on fecundity of *Amblypharyngodon mola*. *J. Indian Ins. Sci.* **41** : 85-88.

RISHI, K. & KAUL, M. 1982. On the fecundity of *Mytus tengera* (Ham.). *Intl. J. Acad. Ichthyl.* **3**(1) : 17-19.

SUDHA, H.R. 2002. Reproductive cycle and environmental factors in Mystus *vittatus* (Bl.). *Uttar Pradesh J. Zool.* **22**(1) : 25-32.

TACHIHARA, K., EBISU, R. & TUKASHIMA, Y. 1993. Spawning eggs, larvae and juveniles of purplish amberjack *Seriola duerili*. *Bull. Jap. Soc. Scientif. Fish.* **59**(9) 1479-1488.

TYLE, C.R., POTTINGER, T.G., SANTOS, E., SUMPTER, J.P., PRICE, S.A., BROOKS, S. & NAGLER, J.J. 1996. Spawning eggs, larvae and juveniles of purplish amberjaek *Seriola duerili*. *Biol. Reprod.* **54**(1) : 8-15.

VARGHESE, T.T. 1973. Fecundity of rohu *Labeo rohita* (Ham.). *Proc. Indian Acad. Sci.* **77** : 214-224.

WALSER, C.A. 1993. Factors influencing the enumeration of channel catfish eggs. *Progressive fish Culturist.* **55**(3) : 195-198.

XU,X.L., JI, W.J., CASTELL, J.D. & O'DOR, R.K. 1994. Influence of dietry lipid sources on fecundity, egg hatchability and fatty acid composition of *Penaeus chiena* brood stock. *Aquaculture*. **119**(4) : 359-370.

ZIVKOV, M. & PETROVA, G. 1993. Fecundity of pike perch. *J. Fish. Biol.* **43**(2) : 173-182.