

NOTES

Induced Breeding of Indian Carps using Des Gly¹⁰ [D-Ala⁶] LHRH Ethylamide

Induction of spawning in Indian cultivated carps by injection of crude pituitary gland extract (hypophysation) is a widely practised method to obtain fish seed as these fishes do not breed naturally in fish ponds (Jhingran, 1975). One of the main limitations of this method is the non-availability of pituitary gland material of reliable potency and hence the need for an alternative synthetic hormone or chemical has been often emphasized (Chaudhuri, 1976; Harvey & Hoar, 1979). The isolation, purification and characterization of the mammalian hypothalamic neurohormone, luteinizing hormone releasing hormone (LHRH) and the subsequent chemical synthesis of LHRH (Matsuo *et al.*, 1971) and superactive analogues of LHRH gave a new tool for the control of reproduction in fishes. Thus LHRH was found to induce ovulation in the ayu (Hirose & Ishida, 1974) and gold fish (Lam *et al.*, 1975) but ineffective in others like *Labeo rohita* (Bhowmick *et al.*, 1979). Extensive studies using LHRH and superactive analogues of LHRH mainly in the salmonid and cyprinid species in Canada and China showed wide variations in the effect according to species, dosage, route of administration etc. (Donaldson & Hunter, 1983; Harvey & Hoar, 1979; Lam, 1982; Peter, 1982).

The present study was conducted at the Fish Breeding Station, Malampuzha, North Kerala during June-July, 1984. Des Gly¹⁰ [D-Ala⁶] LHRH ethylamide (LHRH-A), a synthetic superactive nonapeptide analogue of LHRH (Arimura *et al.*, 1974), supplied by Sigma Chemical Co. was tested for its efficacy in two species *Cirrhinus mrigala* (Ham) and *Labeo fimbriatus* (Bl.). Standard procedure recommended for the induced breeding of Indian major carps (Chondar, 1980) was followed replacing the carp pituitary extract with LHRH-A. LHRH -A was dissolved in 0.6% NaCl and the total volume injected varied from 0.1 to 0.6 ml. In the females, the first injection was given

at 17.00 h and the second injection 8 h later. Males were given single injection at the time of second injection to the females. *C. mrigala* were injected intramuscularly in the caudal peduncle while *L. fimbriatus* were given intraperitoneal (i.p.) injection at the base of the pectoral fin. Other details of dose and experimental conditions are given in the Table 1. Comparison was made with control fishes injected with carp pituitary extract intramuscularly according to standard procedure (Chondar, 1980), carried out as a part of the large scale induced breeding programme at the Malampuzha Station. Total dose of pituitary injected in female *C. mrigala* and *L. fimbriatus* were 9 and 24 mg/kg body weight respectively. Males received 1/3rd of the respective doses.

Results of LHRH-A administration are given in the Table 2. Complete spawning and 70% fertilization were obtained for pituitary injected group also. However the delay in spawning was 6 h more for the LHRH-A injected fish than control. Extended delay in spawning after the second injection has been usually attributed to insufficient dose/potency of pituitary or improper gonadal condition of the breeders and in such cases a third injection is recommended (Chondar, 1980). It is possible that the effect of LHRH-A on gonads is delayed as it acts through the release of endogenous gonadotrophins from the pituitary glands of the breeders, and not directly on the gonads as in the case of pituitary gland extract. But LHRH-A induced spawning simulates the natural neuroendocrine phenomenon controlling breeding more closely than hypophysation.

In *L. fimbriatus* the spawning occurred 6 h after second injection in both LHRH-A injected and control groups. This reduction in the time for spawning in LHRH-A injected *L. fimbriatus* compared to *C. mrigala* may be attributed to the higher dose adminis-

Table 1. Details of induced breeding experiments with LHRH-A

Species	No.	Sex	Weight kg	Dose of LHRH-A (μ g/kg body weight)		Asses- sment of gonadal state	Climate, water tem- perature	Result
				First injection	Second injection			
<i>Cirrhinus mrigala</i> (Ham)	1	Female	1.00	20	60	Distended	Windy,	Complete spawning, 12 h after second injection in all. 75% ferti- lization
	2	„	0.75			soft abdomen	drizzling	
	3	Male	0.75		40	Milt	26°C	
	4	„	0.75			oozing		
	5	„	0.40			on pressure		
<i>Labeo fimbriatus</i> (Bl.)	1	Female	1.15	20	80	Distended	Windy,	Complete spawning, 6h after second injection except in number 2. 95% ferti- lization
	2	„	0.20			soft abdomen	with no rains, 27°C	
	3	Male	0.50		80	Milt		
	4	„	0.50			oozing		
	5	„	0.50			on pressure		

tered and also to the fact that substances are absorbed quickly from the peritoneal cavity. It has also been reported (Harvey & Hoar, 1979) that administration of LHRH-A through the i.p. route considerably reduced the quantity of LHRH-A required for induction of spawning. The lack of response in no.2 *L. fimbriatus* (Table 1) may be due to stunted growth and improper gonadal condition as in the pituitary injected sets also, all the female *L. fimbriatus* weighing less than 400 g failed to spawn. 76% fertilization was obtained in pituitary injected set. Comparing the present results of LHRH-A administration with that of Chinese carps (Peter, 1982), *C. mrigala* and *L. fimbriatus* required less quantity of LHRH-A than black carp (upto 200 μ g/kg body weight) but more than silver carp (2 to 20 μ g/kg body weight). Extensive studies on Chinese carps also showed variations in the total effective dose according to short or long time interval (3 to 10 h) between first and second injection and low or high water temperature (Peter, 1982). The present study

clearly shows that LHRH-A is a promising substitute for the pituitary gland extract currently used, though further studies are required to standardise the dose and method of administration in the various cultivable species of India.

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