STIMULATION INDUCED BY GAMMA RAYS IN *SOLANUM NIGRUM* L.

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During the cytogenetic evaluation of the members belonging to *Solanum nigrum* complex, seed germination was found to a major problem. Different methods were tried for improving the germination percentage but none of them proved to be successful.

Literature review revealed that radiations like gamma rays and x-rays at low doses enhance the germination[1-4] rate. The seeds of diploid and tetraploid plants of *Solanum nigrum* were therefore irradiated with different doses of gamma rays.

The results are indicated in table 1. The germination after gamma ray treatment showed stimulation at 5, 15 and 25 KR in the case of diploid and at 5 and 15 KR in tetraploid. The germination showed relatively less fluctuations in the irradiated tetraploid than in the diploid as compared to their respective controls (table 1).

Table 1.

Effect of Gamma Rays on Seed Germination of Solanum Nigrum

Number of seeds sown—150

Ploidy	Exposure KR	Number of seeds germinated	Germination (% of control)
Diploid	5	47	151
	15	56	180*
	25	41	132
	35	28	90
Tetraploid	5	31	124
	15	34	136*
	25	25	100
	35	23	92

*Values significant at 5% level.

It can thus be inferred that in *S. nigrum* the gamma rays are fairly effective in bringing about enhancement in seed germination. Secondly looking at features such as the germination range, the magnitude of stimulation and reduction in germination induced in the diploid as compared to the tetraploid after the gamma ray treatment it can be concluded that the diploid is relatively more radiosensitive to germination of seed than the tetraploid.

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1. Jahagirdar, A. D., *Cytogenetic studies in Foeniculum vulgare Mill., Ph.D. thesis* Nagpur Univ., 1975.
2. Mackey, J., *Brookhaven Symp. Biol.*, 1956, **9**, 141.
3. Stotzky, G., Cox, E. A., Gross, R. D. Wornick, R. C., and Badger, A. M., *Am. J. Bot.*, 1964, **51**, 724.
4. Torne, S. G., *Curr. Sci.*, 1964, **33**, 24.

OTOLITH AND BACK CALCULATION OF AGE IN *MYSTUS KELETIUS* (VALEN)

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Catfishes have no scales; and their age is determined on the basis of hard parts like vertebrae, pectoral spines and otolith. Otoliths have been employed in several species[1-4].

The present study relates to a local catfish, *Mystus keletius.* Growth rings from otoliths of 103 female fish were examined. The fish was collected from the Tambaraparani river. From the three pairs of otoliths in the inner ear, the sagittae in the sacculus were used. The otoliths were washed in water, air-dried and (using the method of James[5] and Bowering[6]) were ground slightly to obtain greater clarity of the growth rings. They were examined under the microscope and the hyaline and opaque rings identified. The former were regarded as annuli. The length of the otolith, as well as that of the annuli was determined with a micrometer. In *M. keletius*, a maximum of 4 annuli was observed in the otolith. Total lengths of the otoliths were plotted against fork lengths of the fish and a linear relationship was obtained. By the method least squares, the following equation was obtained.

$$L = 2.018 \quad R - 17.43,$$

where L = the fork length of the fish and R is the observed length of the otolith. 2.018 and − 17.43 are constants (regression and zero intercept respectively).

Back calculation of age was done by using Lea's formula modified by Tesh[7]. Using the formula the growth values of the females during 1st, 2nd, 3rd and 4th year of life were calculated (table 1).

TABLE 1

Calculated total length at the end of each year of life female M. keletius by using otoliths

Age of the fish at capture (in years)	No. of fish	Average back calculated length at each annulus (in mm) 1	2	3	4
I	62	48.11			
II	19	52.82	70.69		
III	16	54.21	73.62	84.33	
IV	6	57.42	77.73	90.14	98.42
Mean weighted length (in mm)		50.5	72.9	85.9	98.4
Mean annual increment (in mm)		50.5	22.4	13.0	12.5
Total	103				

It seems that annulus formation in this species occurs only once in a year from July to September. This catfish breeds during these months and the energy required for gonadial activity leaves its impression as a transport zone in the otolith[8]. A similar observation was made by Davis[4] in *Tandanus tandanus.* A maximum of four annuli was observed in the present study and the occurrence of four broods (*i.e.* four different age group of this species) in length frequency studies by Santhankumar[8] leads to the conclusion that *M. keletius* lives in this ecosystem upto four years.

Otolith method of determination of the age and growth shows that it is quite reliable, particularly with this species. Nair[9] also found that otoliths were useful in age studies of oil sardines.

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1. Pantulu, V. R., *Proc. Nat. Inst. Sci. India*, 1966, **27**, 198.
2. Llewllyn, L. C., *Fisherman* (Sydney), 1966, **2**, 14.
3. Tweedle, D. J., *J. Fish Biol.*, 1975, **7**, 611.
4. Davis, T. L. O., *Aust. J. Mar. Freshwater. Res.*, 1977, **28**, 119.
5. James, P. S. B. R., *Mar. Biol. Ass. India*, 1967, **1**, 1.
6. Bowering, W. R., *J. Fish. Res. Board Can.*, 1976, **33**, 1574.
7. Tesh, F. W., *Methods of assessment of fish production in fresh waters*, IBP Hand Book No. 1971, 98.
8. Santhanakumar, G., *Biology of a freshwater catfish Mystus keletius*, Ph.D. Thesis, Madurai Kamaraj University.
9. Nair, R. V., *Curr. Sci.*, 1949, **18**, 9.

CHANGES IN GLYCOGEN LEVELS IN AN AIR-BREATHING FISH, *CHANNA GACHUA* (HAMILTON) FOLLOWING AERIAL EXPOSURE

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AIR-BREATHING fish show a drop in oxygen uptake when exposed to aerial conditions[1-3], indicating the onset of oxygen debt. Though anaerobic glycolysis is suggestive of such an oxygen debt in air-breathing fish, direct evidence for the utilization of stored glycogen under aerial exposure is lacking. An attempt is made in the present investigation to estimate the glycogen levels of liver, heart and muscle tissues of the air-breathing fish, *Channa gachua* under normal and air-exposed conditions in order to understand the pattern of energy metabolism of the fish upon exposure to aerial conditions.

Channa gachua (Order: Acanthopterygii; Family: Channidae) is an obligatory air-breathing fish[3], inhabiting tropical freshwater ponds. Specimens of *C. gachua* (40-50 g), collected from local ponds around Coimbatore, were acclimatized to laboratory conditions in large cement tanks and regularly fed with earthworms and boiled eggs.

Weighed samples of liver, heart and muscle were dissected out from normal fishes and used for biochemical estimation of glycogen. Similarly, tissue samples were also collected from fishes which were previously exposed to aerial conditions (exposed fishes) for 5 and 10 hr. Exposure of the fish was done by maintaining the fish (either for 5 hr or 10 hr) in a glass trough (of 5 litre capacity), covered with wire-mesh containing water-soaked cotton.

The glycogen content of liver, heart and muscle was estimated by employing the method of Kemp and Kits[4]. The glycogen levels in different tissues were