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Studies In Changes of Magnesium, Phosphorous and Iron in Ovary and Testis of Two Species of Fishes Off Jodia Coast in Gulf of Kutch

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ABSTRACT

Minerals like Magnesium,Phosphrous and Iron Content in Ovary and Testis in both Species was studied.Rise and fall level in minerals content in Ovary and Testis was observed in relation to Pre-spwaning,spawningand Post-spwaning periods.All these observed decreasing and increasing treands in minerals content in respective organs have correlation with the gonadial cycle of both the fish.

Keywords : Magnesium, Phosphrous, Iron, Ovary, Testis.

I. INTRODUCTION

It is known that the fish ovary undergoes several histological, anatomical, physiological, cytological and biochemical changes during maturation, spawning and post spawning periods of fishes and possibly because of these it has been main target for may fish physiologists.

Fish ovary is under the influence of pituitary (Yamazaki, 1961; 62; 65; Ball, 1962; Ball et al. 1963; Barr, 1963; 1963a, 63b, 63c; Belsare 1965; Ahsan 1966; Sunder Raj and Nayyar, 1967; Yamazaki and Donaldson, 1968; Pandey 1969; 69b, 69c).

According to some authors the follicular epithelium of fishes is endocrine in nature (BARR, 1968; Hoar 1969; Reinboth, 1972; Iwasaki, 1973). Evidence of steroidogenesis has been reported in corpora luetea of torpedo fish by Cheiffi (1961; 62, 67). The unspawned ova are reabsorbed back in fish ovary (Rajalaxmi, 1966; Busson- Mabinnot; 1967; Dattan and Govindan, 1970; Varghese, 1976); and this study has now attracted attention from several scientists. In his exhaustive work on ovaries of *Scomber scomber* Bara, 1960 has furnished valuable information about various changes occurring during the maturation and shading of occytes and on resorption of unspawned eggs.

Ovaries of fishes of *E. tetradactylum* and *L. tade* are pale yellow organs which occupy a posteriodorsal position in the viscera situated underneath the kidney. The lobes lie together and are fused at the posterior end and opening to the cloaca. The testis are relatively small, pale yellow and elongated organs. It becomes milky white on attaining sexual maturity. The ovaries of fish have shown rise in protein during

maturation (Brackkan, 1958; Korzhenko, 1967), and the rise in lipids which brings about a series of changes in lipid metabolism.

It is known that the fish gonads under of several histological, anatomical, physiological cytological, and biochemical changes during pre-spawning, spawning and post-spawning period. Gonad at the main testis of many fish physiologist other literature some except of testis and ovary regarding that position, shape, size, and activities during different stages.

The maturation and resorption of ova are correlated with the mobilization of minerals to and from gonads to various organs.

Very few reports regarding magnesium content of fish in gonads have appeared (Varghese, 1976), Stapleton (1968). Therefore, with a view to study variations in the Magnesium content in ovary and testes of *E. tetradactylum* and *L. tade* the present investigation was undertaken.

Phosphorus combined with lipids and phospholipid is usually found in fish ovary and in liver. Variations in phosphorus content of ovary and testis of *Pampus argenteus* and *Parastrometeus niger*_during various stages of maturation cycle have been studied by Varghese (1976). With a purpose to study monthly variations in phosphorus content of *E. tetradactylum* and L. tade the present investigations were undertaken.

In testis among all the micro nutrient elements, iron is always in the highest concentration (Gunn and Gould, 1970). In semen iron is especially found in tail proteins and middle piece of spermatozoan (Mann, 1964). Leyding cells of rat testis have also been found to contain small amount of iron. Studies on iron content of fish testis and ovaries are very few. Varghese (1976) has recorded variations in iron Content of ovary and testis of *Pampus argenteus* and *Parastromuters niger* at various stages of sexual maturity. With an aim to study monthly fluctuations in iron content of ovary and testis of both the species *E. tetradactylum* and *L. tade* present study was undertaken.

II. MATERIALS AND METHOD

The Magnesium content was determined from the digested solutions oven dried, homogenized powders of testis and ovaries of *E. tetradactylum* and *L. tade* for this E.D.T.A. volumetric titration method was followed. Data obtained are presented in fig.1,4 and table1,4.

Samples of ovary and testis from live *E. tetradactylum* and *L. tade* separately were dissected out in the field every month (size of fish 10 to 20 cm). The samples were then oven dried at 48^0C for three to five days. The dried homogenized powders were digested with conc. H_2SO_4 and perchloric acid. The digested solutions were made upto certain volume and the phosphorus content in this solution was determined by Fiske and Subbarao method, using Ele. Colorimeter. The results were converted to milligrams per gram and are presented in fig 2,5 and table. 2,5.

The sample of ovary and testis of *E. tetradactylum* and *L. tade* were dissected out separately from fifteen to twenty live fishes every month. The samples were brought to the laboratory and were oven dried at 48^0C for three to five days. The iron content in digested solutions of these homogenized powders was determined by thiocyanate method (Piper, 1966) and the results were converted to milligrams per gram and are presented in fig.3,6 and table 3,6

III. RESULT AND DISCUSSION

The magnesium level in the ovary of *E. tetradactylum* decreases significantly from August to March and it shows higher level during April, June and July. In case of *L. tade,* the Magnesium amount remains at high level during December to March. It increases in April and again rise in Magnesium content is observed during May to August. The magnesium

content in ovary of both the species, shows a decrease level during post spawning and pre-spawning periods. In case of *E. tetradactylum.* In case of L. tade magnesium amount increase just after spawning is over (April). The fall is magnesium amount in ovary of and was recorded after spawning (Varghese, 1976).

The magnesium content in testis of *E. tetradactylum* increases gradually from July to October and it reaches at its peak level in November. It gradually decreases during later period of spawning and again it increases slightly after spawning i.e., April, May. In case of *L. tade* the magnesium content shows gradual increase level from June to November i.e., during pre-spawning and just before spawning a significant fall in magnesium content is observed during December, i.e., during peak period of spawning and again fall down gradually in January to April.

The Magnesium level in testis of both the species increased during process of spermatogenesis to spermatogenesis. When the sperms are stored in somniferous tubules from onwards, the rise in magnesium level is recorded. The magnesium amount decreases in December to February *E. tetradactylum* and December to March *L. date* i.e., during spawning period are the noteworthy results. In case in magnesium of testis from stage I to IV has been also recorded in *Pampus argenteus* and *Parastromateus niger* by Varghese (1976).

The phosphorus content in ovary of *E. tetradactylum* shows decline level in July, August a slight rise in September, again decrease level in October to February. A significant rise in phosphorus is observed content in ovary of *E. tetradactylum* in March to June. In case of ovary of *L. tade* phosphorous content is decreased during pre-spawning and spawning periods. A slight increase in phosphorus content is observed during April, May gradually increase in June and July. the level shows a peak level in August i.e. during pre-spawning period.

Regarding testes of *E. tetradactylum* the phosphorus increases in September, Oct. and remains moderate level during December to February and decreased in Mach and April i.e., during the period when the spawning is over. It again rises in May and June i.e. during recovery period. In case of *L.tade* phosphorus content in testis increased gradually during spawning period but comparatively it remains at low level in April and again it increases.

A higher level in phosphorus contents in testis of *E. tetradactylum* is observed in August and September. It is evident from above results that phosphorus content, shows higher level when process of gametogenesis starts. It shows a decline level during spawning period. It may be attributed to depletion.

The highest amount of phosphorus in gonads is recorded from December of February i.e., during spawning. Varghese (1970) has recorded fall in testicular phosphorus after spawning in both *Pampus arageneteus* and *Parastromateus niger.* However no significant change in phosphorus of both the ovaries was recorded in these two spent species.

In *E. tetradactylum* and *L .tade* the trend of fluctuations in phosphorus content in ovary and testis remains same in both the species.

The iron content in ovary of *E. tetradactylum* shows peak level in June and it increase during July to August. It remains at normal level during December to May. In case of ovary of *L. tade.* the iron content in ovary shows highest level in February. It decreases in March and April. It remains at normal level upto August. The iron content in ovary of *L. tade* increases during September to November and again it falls down in December. Referring to graph and table of iron content of testes of *E. tetradactylum,* it gradually increased from September to November. It comes down at low level from December to February. It again increases in April and May. In *L. tade* the iron content shows higher level in April, May, June, August and September. The iron level declines in October, November, and December. A slight increase level in January and February. It is evident from the above results that the iron content increases in Gonads during pre-spawning and just before spawning. It shows decline level during spawning and

post spawning period. The rise in iron in both the species during pre-spawning and just before spawning may be attributed to the accumulation of minerals including iron during the active process of gametogenesis as well as maturation of gonads occurred. The iron content has a close association with sexual maturity especially during development and the formation of gametes in testes as well as in ovary. The decline level of iron content during post-spawning period can be attributed to depletion. Varghese (1976), has recorded fall in iron content of both the testis and ovary of the spent *Pampus argenteus* and *Parastromateus niger* during early stages of maturity of gonads in *Parastromateus niger.*

Table-1 Showing the Magnesium content in ovary in mg/gm

Month	*E. tetradactylum*	*L. tade*
January	3.80±0.10	3.20±0.03
February	3.50±0.23	3.85±0.07
March	1.65±0.07	4.32±0.06
April	4.85±0.07	1.13±0.08
May	2.35±0.14	1.10±0.05
June	5.10±.08	1.01±0.07
July	4.95±0.12	1.41±0.05
August	4.10±0.08	1.55±0.04
September	5.02±0.28	2.95±0.07
October	3.50±0.28	2.86±0.07
November	3.55±0.13	3.10±0.12
December	3.15±0.07	3.00±0.06

Table-2 Showing the Phosphorus content in ovary in mg/gm

Month	*E. tetradactylum*	*L. tade*
January	12.15±0.42	12.15±0.43
February	14.10±0.75	10.85±0.86
March	23.25±0.86	17.30±0.085
April	31.20±0.00	9.40±0.86
May	27.70±0.85	15.30±.82
June	32.15±0.85	22.25±0.00
July	20.30±0.85	36.60±.85
August	26.25±0.86	45.00±0.85
September	12.40±0.85	30.20±0.86
October	22.75±0.86	26.25±0.86
November	14.35±0.86	21.75±0.85
December	18.30±0.85	10.90±0.88

Table-3 Showing the Iron content in ovary in mg/gm

Month	*E. tetradactylum*	*L. tade*
January	14.45±0.96	10.00±0.09
February	28.90±0.96	26.10±0.98
March	33.90±0.95	23.90±0.97
April	16.90±0.00	16.70±0.00
May	25.55±0.96	24.45±0.96
June	46.10±0.96	33.90±0.96
July	34.45±1.90	36.65±1.67
August	41.65±0.00	38.90±1.92
September	18.90±1.90	42.20±0.95
October	19.95±0.96	50.00±0.00
November	16.70±0.00	48.85±0.95
December	24.40±0.93	24.45±0.97

Table-4 Showing the Magnesium content in testis in mg/gm

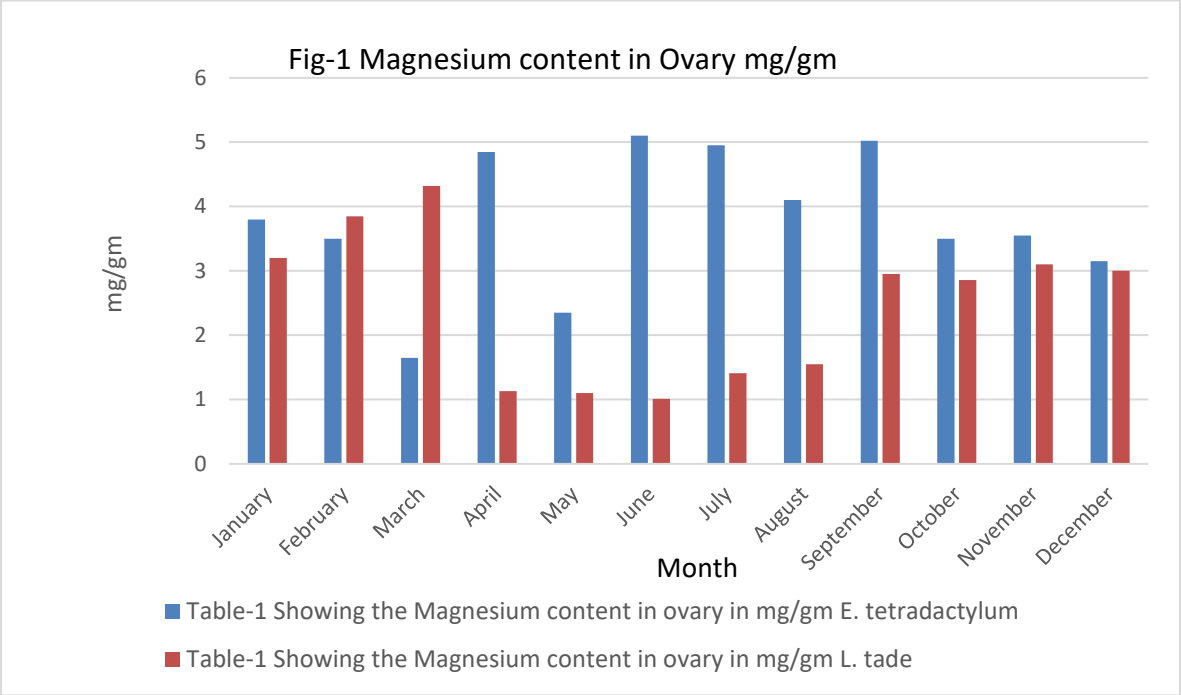
Month	*E. tetradactylum*	*L. tade*
January	2.6±0.29	3.36±0.07
February	1.35±0.01	2.43±0.00
March	-	-
April	2.0±0.13	1.90±0.05
May	2.8±0.36	2.05±.07
June	2.1±0.15	1.00±0.12
July	2.3±0.12	-
August	2.0±0.12	1.95±0.07
September	2.2±0.03	2.55±0.13
October	2.4±0.07	2.80±0.12
November	3.9±0.07	2.90±0.06
December	3.6±0.05	1.40±0.06

Table-5 Showing the Phosphorus content in testis in mg/gm

Month	*E. tetradactylum*	*L. tade*
January	30.20±0.86	18.80±0.87
February	38.55±0.00	14.85±0.00
March	-	-
April	23.25±0.86	25.70±0.86
May	29.70±0.00	7.45±0.00
June	30.65±0.86	26.20±0.86
July	32.15±0.85	-
August	35.15±0.85	32.15±0.85
September	51.45±0.86	37.10±0.00
October	41.00±0.84	13.60±0.43
November	44.00±0.85	10.90±0.43
December	41.55±0.00	15.30±0.85

Table-6 Showing the Iron content in testis in mg/gm

Month	*E. tetradactylum*	*L. tade*
January	42.20±0.96	33.85±0.96
February	26.65±0.00	32.20±0.96
March	-	-
April	50.00±0.00	66.10±0.96
May	66.10±0.96	57.20±0.95
June	49.95±0.96	49.45±0.96
July	42.20±0.96	-
August	58.85±0.96	62.75±0.95
September	41.65±0.00	65.70±0.95
October	59.40±1.90	25.50±0.96
November	82.75±0.96	16.67±0.00
December	51.10±1.92	15.55±0.96



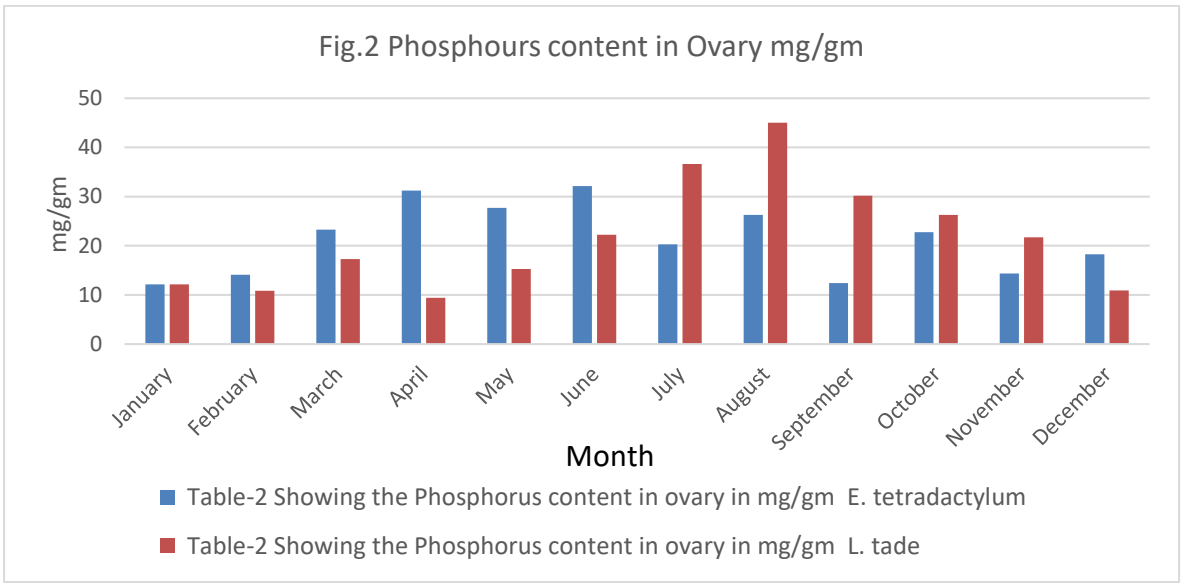


Fig.2 Phosphours content in Ovary mg/gm
mg/gm
50
40
30
20
10
0
January
February
March
April
May
June
July
August
September
October
November
December
Month
Table-2 Showing the Phosphorus content in ovary in mg/gm E. tetradactylum
Table-2 Showing the Phosphorus content in ovary in mg/gm L. tade

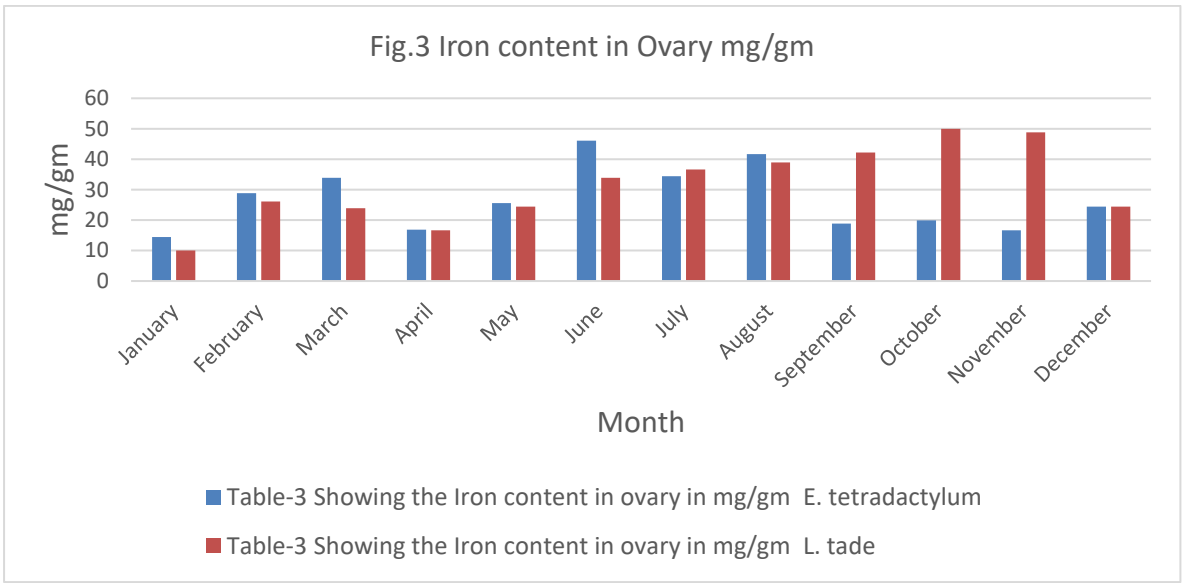


Fig.3 Iron content in Ovary mg/gm
mg/gm
60
50
40
30
20
10
0
January
February
March
April
May
June
July
August
September
October
November
December
Month
Table-3 Showing the Iron content in ovary in mg/gm E. tetradactylum
Table-3 Showing the Iron content in ovary in mg/gm L. tade

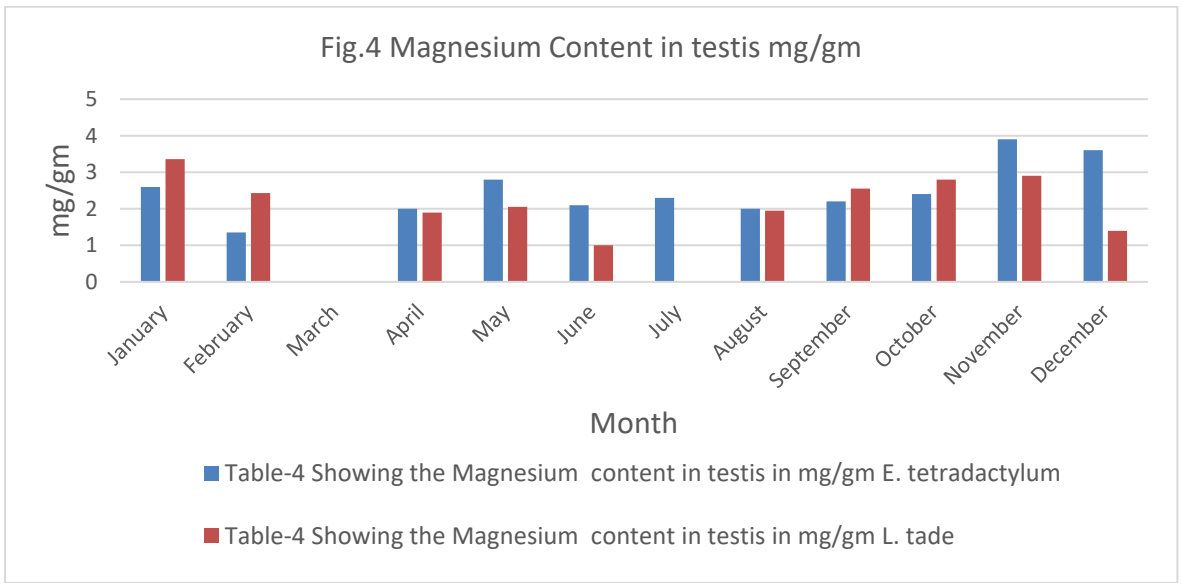
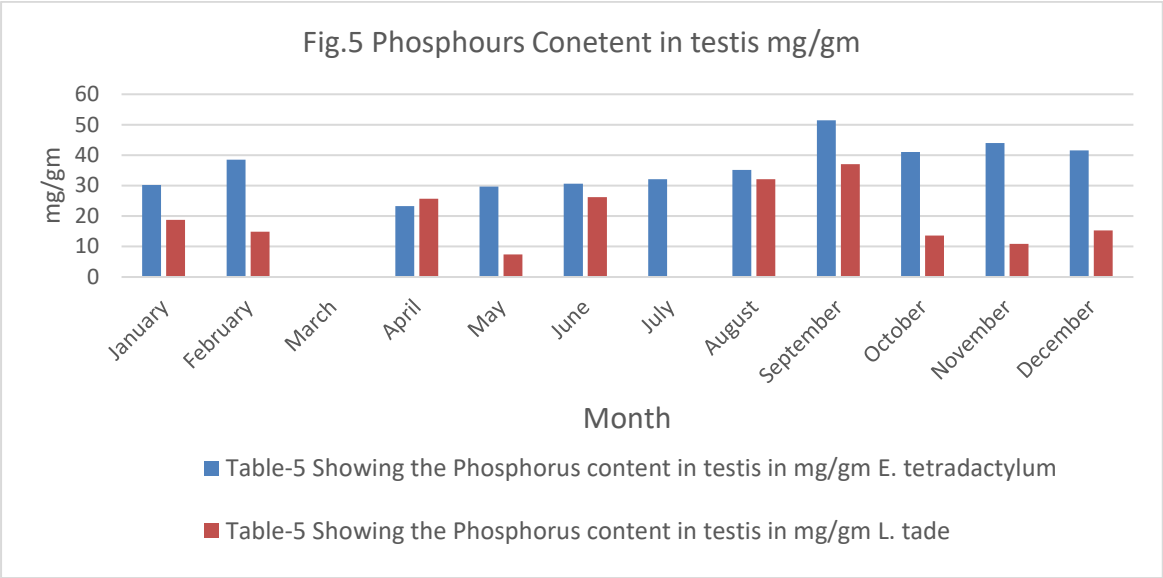
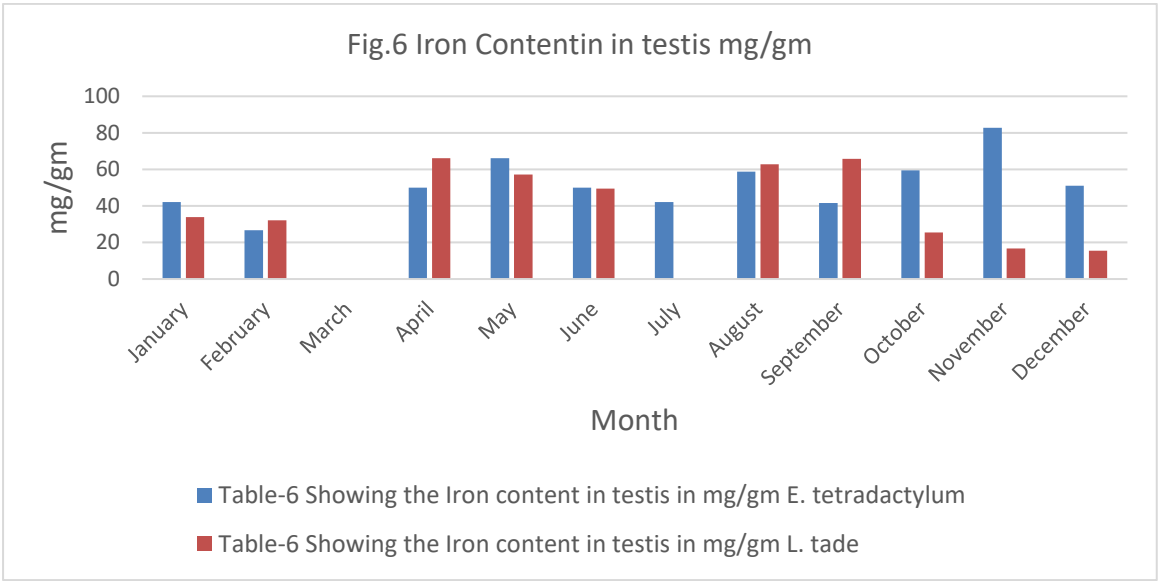


Fig.4 Magnesium Content in testis mg/gm
mg/gm
5
4
3
2
1
0
January
February
March
April
May
June
July
August
September
October
November
December
Month
Table-4 Showing the Magnesium content in testis in mg/gm E. tetradactylum
Table-4 Showing the Magnesium content in testis in mg/gm L. tade





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