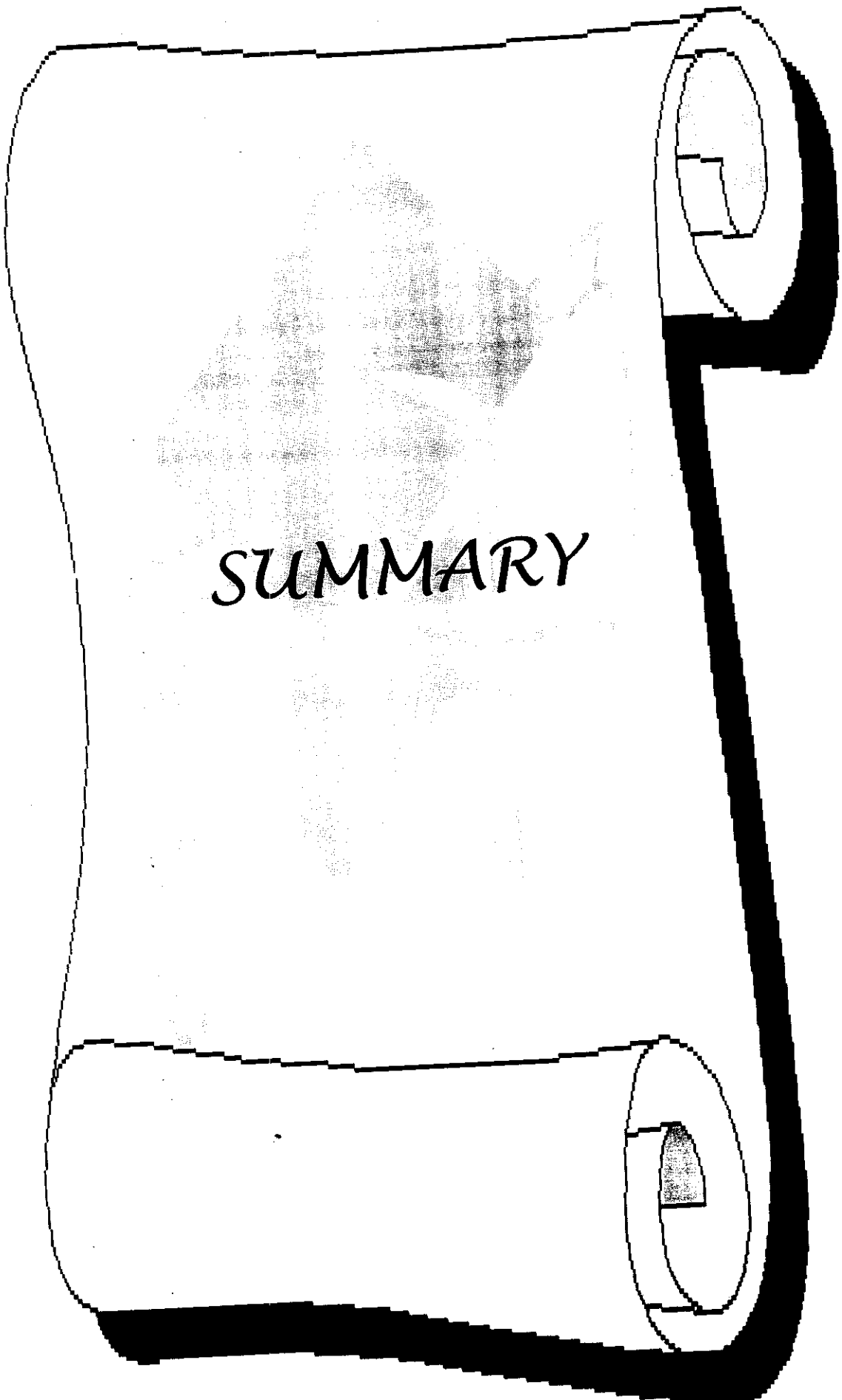
SUMMARY

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The fish is considered as economically important, since they are a good source of human protein. As a result of, increasing the demand of the fish, the world towards to mariculture to increase the total yield of fish.

Since 1928, Mullet fry (*Mugil cephalus*; *Liza ramada*; *Liza saliens*; and *Liza aurata*) were introduced to Lake Qarun. Lake Qarun is isolated habitat and so, it is absolutely not favorable for breeding of adult mugilids. So, all Mullet species have to be transplanted annually to maintain their stock in the lake. In the last decade, the total yield of fishes was decreasing.

Liza ramada were chosen in this study. This study included the following studies:

1- Study the reproductive biology by studying sexual maturity of gonads at breeding season, gonado-somatic index (GSI) and egg diameter. histological Studies of gonads to give background about the seasonal changes in oogenesis and spermatogenesis.

2- Determine the level of sex steroid hormone levels in the plasma during maturation stage in both male and female fish.

3- Determination the optimum environmental conditions (temperature, photoperiod and salinity) for reproduction and induced spawning of *L. ramada* by using intramuscular injection with Human Chorionic Gonadotropin (HCG).

4- Distribution of ova and mullet fry spp. in Lake Qarun.

5- Feeding behavior of *L. ramada* fry in Lake Qarun.

The monthly fluctuation of the GSI of both sexes so far agrees with the monthly variation of maturity stages. The peak value was

attained in November for male and in December for female, after that the GSI decrease sharply. From the analysis of GSI, it is clear that the spawning season extended from October to December, where gonads resorbed without ovulation or spawned egg.

The morphological and histological studies of gonads of both sexes *L. ramada* from August to February that included pre-spawning period; spawning period and post-spawning period.

According morphological studies, the maturity stages of both sexes *L. ramada* were divided into: immature, developing or recovering spent, maturing, mature stage, ripe stage then atresia and resorption.

According histological studies of ovary, the maturity stages of *L. ramada* were divided into five periods as the following: resting period, vacuolization of the cytoplasm period; yolk deposition period, ripe period, and atretic egg period.

For female the oocyte maturation was divided into nine stages as the following Chromatin nucleolus stage, early perinucleolus stage, late perinucleolus stage, lipid-yolk vesicle stage, primary yolk deposition stage, secondary yolk deposition stage, tertiary yolk deposition stage, migratory nucleus stage and mature egg stage then atretic oocytes.

The atretic oocytes have four main types of atresia that belong to the Burasting atresia.

So, it is obvious that the gonads of *L. ramada* develop to reach full degree of ripeness then resorption oocyte without spawning and hence no ovulation takes place in Lake Qarun.

According histological studies of testes, the maturity stages of *L. ramada* were divided into five periods as the following: immature, developing or recovering spent, maturing, mature, ripe then atresia.

For male, five spermatogenetic cells were recognized as the following: spermatogonia, primary spermatocyte, secondary spermatocyte, spermatid and sperms.

From, the studies of environmental parameters effect on the gonad maturation of *Liza ramada*. It was indicated that temperature is effective as stimulating agent in both sexes. At 18 °C, it was recorded GSI value (27.82), allow the oogenesis and spermatogenesis where able to advance, but higher and lower than 18 °C inhibit the maturation and spermatogenesis process.

According to photoperiod, it was indicated that the breeding season of *L. ramada* was limited from November to December or January is presumably due to the light conditions. But moderate photoperiodicity (12 hr. L./12 hr. D.) was recorded 27.82 of GSI, is apparently necessary to stimulate oogenic or spermatogenic activity. The results showed that GSI at photoperiod (16hr. L./8 hr. D.) and (8 hr. L./16 hr. D.), obvious decreases to 4.65 and 3.59 respectively. Therefore, increasing and decreasing in photoperiod indicated were not suitable for gonadal maturation. The highest GSI value (28.4) was observed in females treated with (5,600 I.U./fish of HCG) after 4 th injection, while the highest GSI being 6.45 occurred in male after 2 nd injection with a cumulative dose of 1500 I.U./fish of HCG.

Egg diameter inside the ovary of *L. ramada*. It was observed that it affected by environmental parameters. It was indicated that the oocyte diameters were negatively affected by increasing the temperature over 18 °C. Its maximum value of 0.512 mm, at 18 °C, while it decreased to 0.399 mm., at 28 °C.

Oocyte diameters were negatively affected by increasing or decreasing the photoperiod than 12hr. L./12hr. D. The highest egg diameter was found of 0.488 mm at photoperiod, 12hr. L./12hr. D.

Oocyte diameters were positively affected by increasing the HCG doses. Whereas it increased from 0.610 mm in non-injected fish, to 0.927 mm., after 24 hr. of the 4 th injection.

This study included effect of environmental parameters on the sex hormones in plasma during maturation stage The results indicated that there is negative relation between estadiol concentration and temperature when its value of 4300 mIU/ml. at 14 °C decreased to 242 mIU/ml. at 28 °C. This phenomenon was completely reversed with progesterone when its value of 0.33 ng./ml. occurred at 14°C, while at 28 °C, its level reached to 0.89 ng./ml.

For male, it was found that the testosterone and estradiol and progesterone concentrations male *L. ramada* were high at 14 °C and decreased with increasing temperature.

Also, Estradiol and progesterone levels at 8hr. light/ 16 hr. dark, decreased with increasing light to 16hr. light, in control and injected female, while the phenomenon was completely reversed for testosterone concentration The results revealed that the concentrations of testosterone and progesterone of male (control & injected) had negatively affeeted by increasing the photoperiod, while estradiol showed abnormal increase with increasing light time.

Also, the results indicated that Testosterone concentration of female and male (control and injected) had positively affected by increasing the salinity form 8 ‰ to 38 ‰. On the other hand, progesterone concentration of female and male (control and injected) had negatively affected by increasing the salinity, while the reverse was true for the injected male. Estradiol concentration of control and injected

female had decreased by increasing the salinity, while its level of male control increased with increasing the salinity and vise versa for injected fish.

The results indicated that the best period for progesterone and estradiol secretion was observed during vitellogenesis, while the higher level secretion was in spermiation process. The lowest level in ripe male *L. ramada* was found during the spawning period.

L. ramada female induced successfully by injection with 5,600 I.U./fish where the number of ovulated eggs being 499 egg/g, GSI was 28.45 and the average egg diameter was 0.728 mm.

Ova of *Liza saliens, Solea aegyptiaca* and *Atherina mochon* were in embryonic developmental stage inside egg membrane that was collected from Lake Qarun. It was observed that ova of *L. saliens* have one- large oil globules; few number (1-3) smaller globules. While, the mean egg diameter of *L. saliens* was 0.69 mm., and oil globule diameter was about 0.16 mm.

L. saliens eggs constituted 0.4 % of total number of eggs collected during one year survey. *L. saliens* eggs appeared in April and occurred till the first week of November with maximum value in July. It was notice that it was slightly localized in the eastern station and accumulated in the western stations. Salinity during appearance of egg *L. saliens* ranged from 33.1 ‰ to 40.7 ‰.

The abundance and dominance of that food in the Lake water affected feeding selectivity of mullet fry on zooplankton items. Nauplis larvae and *Brachionus plicatilis* were dominant in the lake water and so, the stomach of *L. ramada* was filled with these species. Also, *L. ramada* fry fed on fish eggs.

There is no significant variation between the diet composition and large or small sizes mullet fry.