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FECUNDITY VARIATIONS OF BLACK TIGER SHRIMP *PENAEUS MONODON* FROM TWO DIFFERENT GEOGRAPHICAL LOCATIONS, EAST COSAT OF ANDHRA PRADESH, INDIA

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Abstract

The investigation of the current study revealed that the information on fecundity variations in relation with size, weight, and breeding grounds of the *Penaeus monodon* population. The study has been undertaken for the three consecutive years from 2010-2012. Among the two different breeding grounds the Kakinada landing station showed relatively less fecundity values at a body weight of 90–110 gr. The observed fecundity values were 2,60,295, 2,25,996 and 1,72,132 in the month of January during the years of 2010–2012 respectively, at a maximum weight of 251–270 gr. The recorded values were 6,84,275, 7,21,910 and 7,23,251 during the years of 2010-2012 in January. Female shrimps from Bhairavapalem revealed highest fecundity values the fecundity values were more or less similar in 2010– 2012 in the shrimps collected from Bhairavaplem, at a minimum weight range of 90–110 the fecundity rates observed were 2, 82,304, 3, 21,924 and 3, 26,221 in the month of January during the years of 2010-2012 respectively.

Key words: Fecundity, Geographical variations, Breeding grounds and Mangroves.

INTRODUCTION

Studies on fecundity of penaeid species has gained importance in now –a-days it has great bearing on size, structure and quality of the population. Previous workers have been performed to close the life cycle and improve reproductive performance of different penaeid species in captivity [1, 2, 3, 4]..Although fecundity in penaeids has been reported to increase with female size [5, 6, 7, 8]. Several studies have looked into the improvement of the reproductive output of domesticated penaeid stocks, wild-caught animals are usually regarded as having superior performance in terms of fecundity [9, 10, 4, 7], offspring quality [11, 12, 13] and final oocyte maturation [14]. Since the information on fecundity of *Penaeus monodon* with reference to geographical variations and their effect on fecundity is very scanty. So the study has been undertaken to evaluate the fecundity efficiency in relation to size, weight and breeding grounds.

MATERIAL AND METHODS

Fecundity ratios were calculated in shrimp *Penaeus monodon* for different body weights and lengths by adopting the standard regression equation $Y = Mx+C$ [15]. For the estimation of fecundity the gravid females (stage III & IV females) were collected from two distinct geographical locations, to assess the fecundity variations according to geographical variations.

The gravid females were brought from two different landing stations which includes Kakinada and Bhairavapalem. Healthy, hygienic female shrimps with intact ovary were selected for this study. Continuous aeration was provided during transportation by stored them in plastic storage containers at a density 100 No/500 liters of treated seawater.

Experiments were performed at Pavan Aqua Pvt. Ltd. located~ 5 KM north of Visakhapatnam, usually the seawater was drawn by HDPE and PVC pipeline into the hatchery, which is about 250-300 meter from the shore. For settlement of suspended particles in the sea water, the water was allowed for period of 3-4 hrs, and then the water was allowed to pass through a slow sand filter having the capacity of 10 tonnes. Then the water was chlorinated with calcium hypochlorite powder at rate 10-15 ppm chlorine, de-chlorination was done accordingly with re-circulation of water for a period of 1-2 hrs, through rapid sand filter. Then after re-circulation, the chlorine was estimate by using chlorscope. Residual chlorine was removed by treating with sodium thiosulphate ($Na_2S_4O_7.5H_2O$). Immediately after dechlorination the water was again treated with 10 ppm ethylene diamine tetra acetic acid (EDTA). The treated water was used for all practical purposes.

For acclimatization of gravid females for the new environment, immediately upon arrival, the gravid females were kept in plastic tubes with treated seawater in the laboratory, at temperatures (29-31°C). After a period of 7-8 hrs, the gravid females were transferred into spawning tanks. Different sizes of 250 and 500 liter FRP tank were used for various experimental purposes.

After 20-40 mints of acclimatization healthy and active gravid females were allowed for prophylactic treatment with disinfectants such as potassium permanganate and formaldehyde. The shrimps were reared in FRP tanks of 1 meter diameter with 500 liter of treated water. One shrimp was maintained in each tank, continuous aeration was provided throughout the experiment. The length and weight of each animal was recorded and tabulated.

Usually spawning was observed to take place during night time (10-1 'O' clock). By using an underwater torch light the animal was observed for complete or partial spawning. After spawning the animal was shifted from spawning tanks. The eggs were collected from that tanks, by siphoning and transferred to a harvesting bucket with 100µ mesh partition. The eggs were washed thoroughly with treated seawater and vigorous aeration was provided in the buckets. The fecundity was estimated through random sampling, by means of a pipette and 50 ml sample beakers.

RESULTS

Considerable variations in fecundity ratios were noticed in shrimps collected from different geographical locations. Studies were conducted in two stations Kakinada and Bhairavapalem revealed significant variations in fecundity ratios (Figure 1). Fecundity ratios of *P. monodon* were investigated from 2010 to 2012.

Body Weight and Fecundity Relationship

Female shrimps from Kakinada landing station showed relatively less fecundity values. At a body weight of 90 – 110 gr. the fecundity values observed were 2, 60,295, 2, 25,996 and 1, 72,132 in the month of January during the years of 2010–2012 respectively. At a maximum weight of 251 – 270 gr. the values observed were 6, 84,275, 7, 21,910 and 7, 23,251 during the years of 2010-2012 in January. In Kakinada landing station also there were no strict variations in the fecundity values with reference to season or during the three years of study (Figure 2)

Female shrimps from Bhairavapalem revealed highest fecundity values. The fecundity values were more or less similar in 2010 – 2012 in the shrimps collected from Bhairavaplem, (Figure 1), At a minimum weight range of 90–110 the fecundity rates observed were 2, 82,304, 3, 21,924 and 3, 26,221 in the month of January during the years of 2010-2012 respectively.

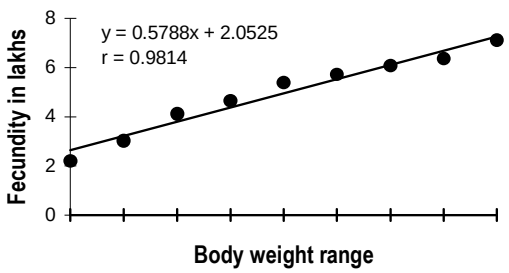
DISCUSSION

When the two landing stations are compared, Kakinda landing station showed low fecundity ratios at the same weight group of animals. The same trend was seen in smaller and larger size groups of shrimps. But as per landing station Bhiravapalem has relatively higher fecundity rates in all the three years of study.

The dynamics of the population influenced by the number of eggs produced at a given time. Studies of [16, 17] revealed that the number of eggs carried by the female as fecundity, although these data actually represent the number of eggs ovipaositioned at a given time i.e. their clutch size [18, 19]. Generally Penaeid species are profundly fecund in their natural grounds and may produce 1,00,000 to over 10,00,000 eggs per spawning it is observed that 10,00,000 fecundity is the highest and this decrease in body size and weight. [20, 21] also reported similar fecundity values in penaeid shrimps. There is a positive correlation between female size and number of eggs produced and larger species,

such as *P. monodon*, produce higher number of eggs per spawn than smaller species such as *P. indicus*. The main concept of this work is to estimate the probable role of mangroves or other grounds on the fecundity rates of shrimps.

It is important to mention here that there is a marked difference in the fishing grounds and fishing craft operated at the two different landing stations. The shrimp landings at Kakinada represented the catch mostly with small boats were operated here in near shore water 2 - 3 Km away from the coast at < 10 mts. depth. Bhiravapalem is a station situated in the heart of the Godavari mangroves, South of Kakinada. Here both smaller and larger boats were operated in the vicinity of the mangrove zone. Both near-shore and off-shore landings were landed here. Some of the catch landed here was also from Vadalarevu and Antarvedi areas in the vicinity of the mangrove zone.



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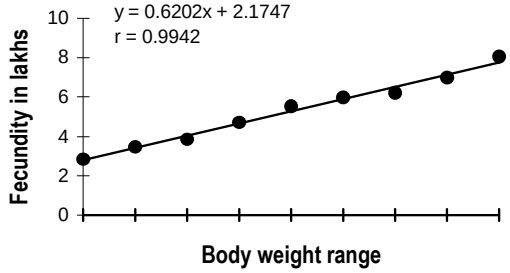

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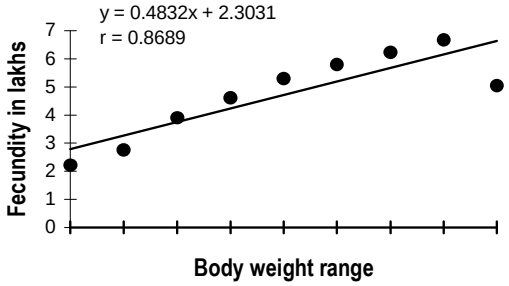

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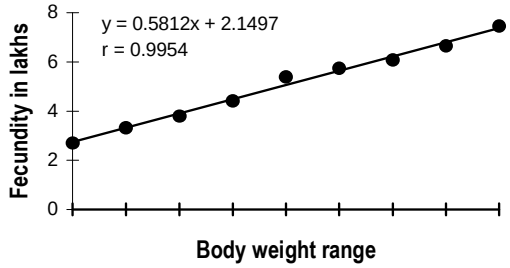

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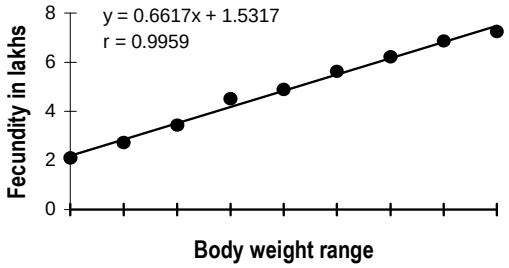

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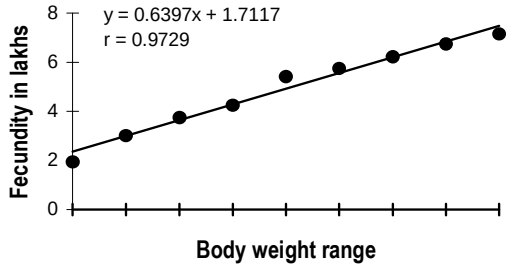

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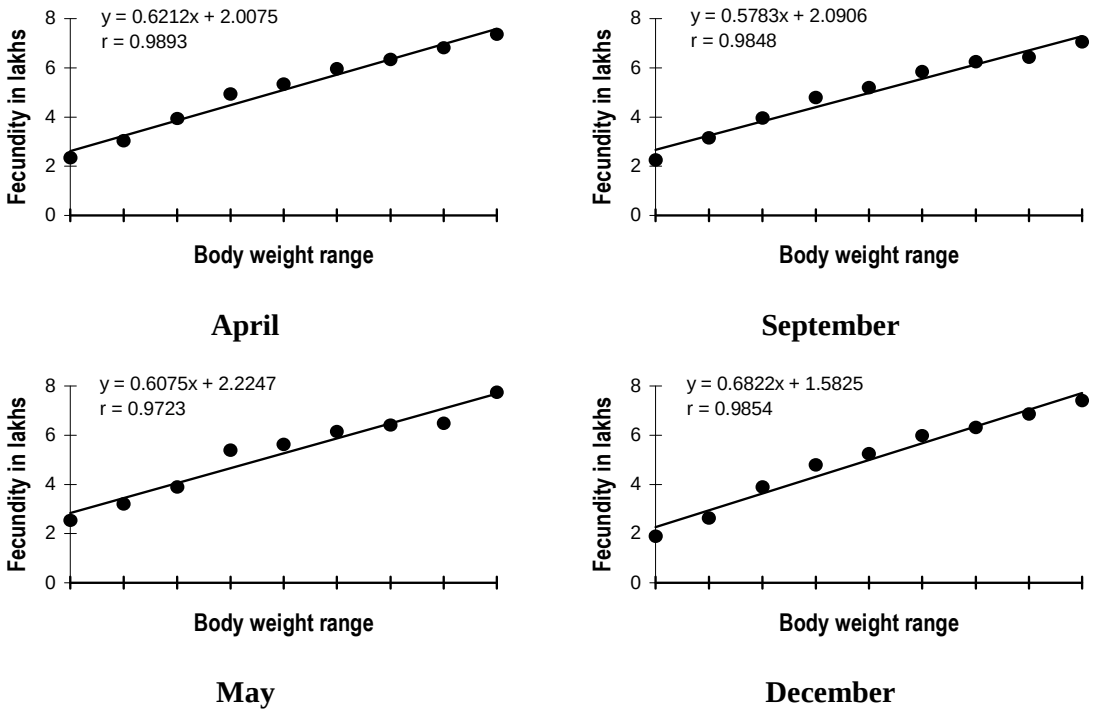
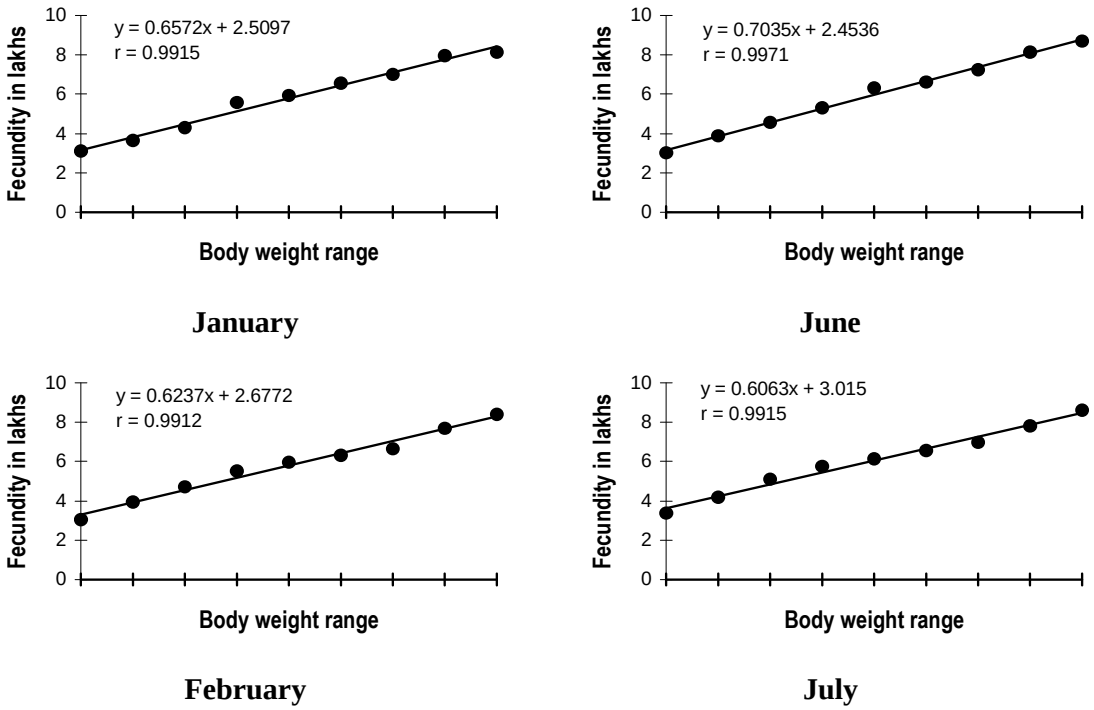


Fig. 1: *P. monodon***,** fecundity rates in different months at Kakinada during 2010 – 2012.



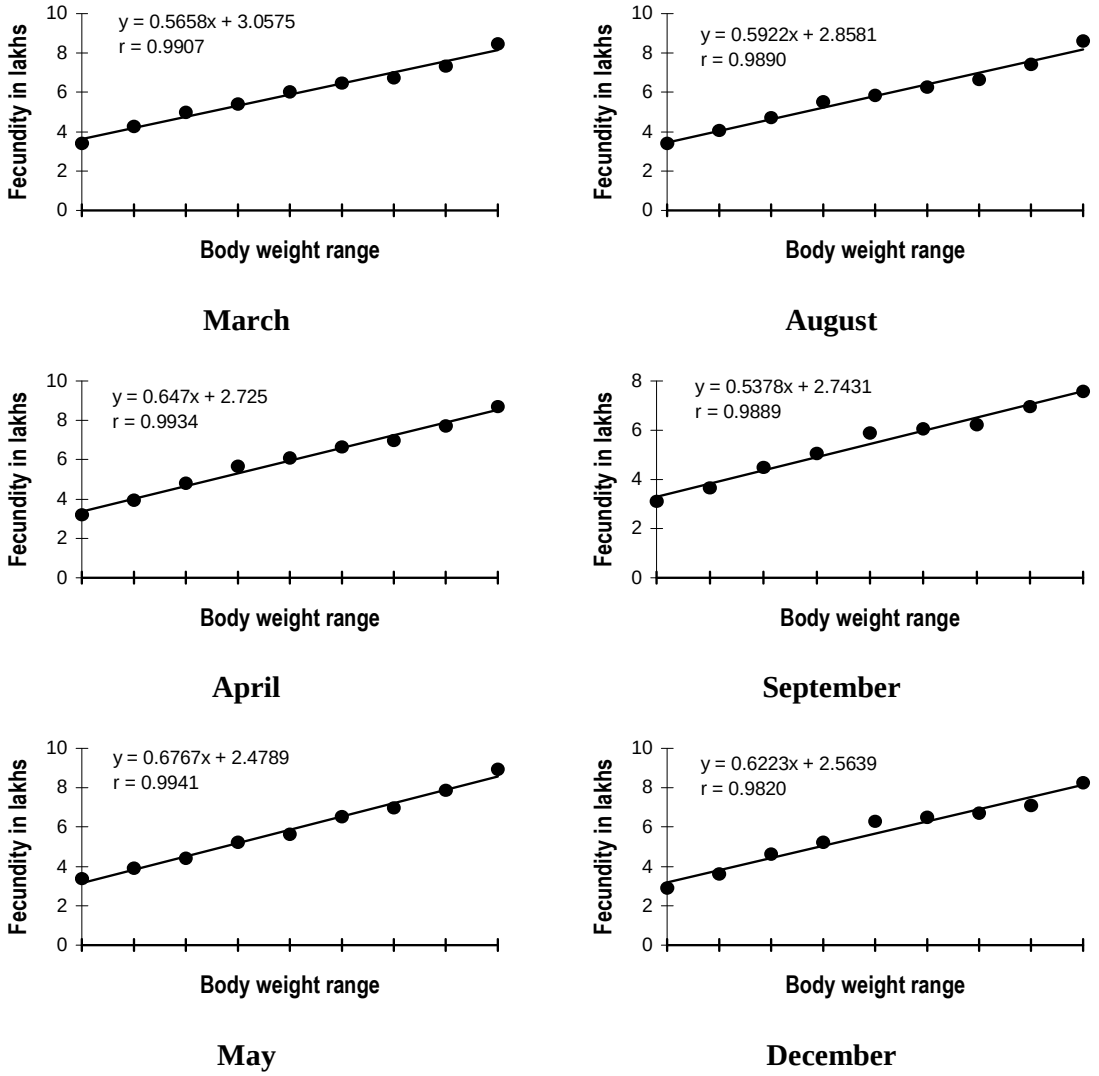


Fig. 2: *P. monodon***,** fecundity rates in different months at Bhiravapalem during 2010 – 2012.

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