

Research Article

Gonadal Response in Male and Female Redheaded Bunting, *Emberiza Bruniceps* under Various Photoperiodic Schedules (Artificial Photoperiods)

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Abstract: This investigation is carried out with photoperiodic response of bird under artificial photoperiods of 24 hrs and other than 24hrs, which divided into short and long photoperiod. Gonadal growth in Red headed bunting, *Emberiza bruniceps*, assessed by laprotomy and comparison with known weights, comparison shows similar trend except that magnitude of response is different.

Keywords: Testes weight, Ovarian weight, Redheaded bunting, Artificial photoperiodism

INTRODUCTION

The measurement of day length is yet another important component of avian photoperiodic response system (PRS). A response to light, the photoperiodic response is the result of the interpretation of light input by the neuroendocrine machinery, collectively called the photoperiodic response system (PRS) [1-3].

Red headed bunting is a photoperiodic bird that follows the annual solar cycle for gonadal growth [4]. Gonadal response of bird is studied under artificial photoperiods of 24 Hrs and other than 24 Hrs.

MATERIALS AND METHOD

Red headed bunting, *Emberiza bruniceps*, belonging to the family, Emberizidae, order Passeriformes. Which is seasonally breeding migratory finch. The Red headed bunting is beautiful with golden brown head (above) and under par yellow but female is dull looking ashy brown head (above), buffish washed with yellow (below) and under tail-coverts yellow.

Birds were maintained under natural day length, fed with paddy grains, *Oryza sativa*, kakoon, *Setaria italica* and water. Foods and water were changed daily and available at all the times in cup attached with wire net.

In experimental photoperiods, birds were exposed to artificial photoperiodic treatments in light proof wooden boxes. The boxes were fitted with the fluorescent rods of 20 watt, the light intensity of 400-500 lux, available at perch to floor level in the cages. In artificial

photoperiodic treatments the 'light on' commenced at 0600 Hr. The periods of light and dark especially in 24 hr cycle were controlled by automatic time switches.

Photoperiodic treatments given in the course of experiment are different in duration of light and dark periods. The light and dark periods consisting of a total 24 hr are divided on 03 hrs light and 21 dark (3L:21D), 06 hrs light and 18 hrs dark (6L:18D), 8L:16D, 12L:12D, and 16L:8D. 3L:21D, 6L:18D, 8L:16D and 12L:12D are called as short photoperiod and 16L:8D is called long photoperiod; this is with reference to the photoperiodic threshold for induction of gonadal growth and body weight response in the bird [4, 5].

Gonadal weight was assessed *in situ* by unilateral exploratory laprotomy and estimated by comparing the sizes of testes/ovary with another standard sets of fixed gonads of known weights.

EXPERIMENTS AND RESULT

The birds, both male and female were exposed to artificial photoperiods of light and dark in 24 Hr cycles. Various photoperiodic schedule, thus formed are 3L:21D, 6L:18D, 8L:16D, 12L:12D and 16L:8D. Before placing of the birds under artificial photoperiodic conditions they have already been received the pretreatment of 8L:16D for more than 04 weeks. This was done to ensure the photosensitivity of the birds. Photoperiodic treatment carried out for 30 day and minimum 05 birds (n=05) were maintained during the

experiments. The testes remain quiescent and maintained its initial value after 30 days of exposure in all photoperiodic schedules excepts in 16L: 8D. The value of testicular growth under 16L: 8D was significantly higher ($P < 0.001$) than other photoperiodic schedules (Table 01). The female also exhibited similar pattern of response showing the significant growth in ovaries ($P < 0.001$) under 16L: 8D (Table 2). An increment in both testicular and ovarian weight was marked under the 12L: 12D photoperiod showing initiation of gonadal growth.

The comparison of the both ovarian and testicular response under various photoperiods shows similar trend except that magnitude of response is different.

DISCUSSION

Observation on testes and ovarian growth under varying artificial photoperiods clearly demonstrate that Redheaded bunting require long day of above 12Hrs to induce the reproductive functions. Birds do not show gonadal stimulation under 3L: 21D, 6L: 18D, 8L: 16D and 12L: 12D by the end of the experiment but in response to 16L: 8D they exhibit full gonadal growth.

The previous reports on gonadal response in redheaded bunting reflects different pattern that the observed in this study. It is worth mentioning that photo stimulated captive females do not acquire maximal ovarian growth and maturation as the plasma level of FSH and LH remains many times lesser than those of natural birds [6-8]. Yokoyama K and Farner DS have experimentally demonstrated that the final ovarian development in photo stimulated white crowned sparrow is suppressed by the inhibitory information from the retina [9]. According to them in intact females the ovarian and oviducal growth with plasma level of LH remain twice lesser than those of blind birds.

Observation present in Table 1&2 indicated photoperiodic gonadal response of Redheaded bunting under both 24 Hrs photoperiodic schedules. Our report supports the photoperiodic regulation of such activities in migratory birds as described by several workers [4, 10, 11]. The observations made in the present investigation are in the agreement with the external coincidence. Numbers of reports on other birds are available for review and analysis [12-16] are well investigated avian species.

Table 1: Study of the Testicular Response in Redheaded Bunting under Various Photoperiodic Schedules

Photoperiods	Testicular Weight(mg) (Mean±SE)	
	Initial	Final
16L:8D	3.80± 0.25	280.40±12.25*
12L:12D	3.20±0.21	32.82±4.68
8L:16D	2.60±0.25	03.62±0.36
6L:18D	2.80±0.25	03.20±0.28
3L:21D	3.20±0.26	02.86±0.26

*P value<0.001, with respect to the values of its own initial and final values of the other photoperiods.

Table 2: Study of the Ovarian Response in Redheaded Bunting under Various Photoperiodic Schedules

Photoperiods	Ovarian Weight (mg) (Mean±SE)	
	Initial	Final
16L:8D	3.66±0.25	26.0±2.68*
12L:12D	4.16±0.31	8.0±3.24
8L:16D	3.80±0.28	4.6±0.28
6L:18D	3.20±0.26	4.0±0.32
3L:21D	3.80±0.28	4.2±0.26

*P value<0.001, with respect to the values of its own initial and final values of the other photoperiods.

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