visible parts of spectrum by using narrow and broad band filters[1]. Light emitted by pollen/spores and organic matter after excitation is measured by computer and a graph plotted for intensity vs spectral wavelength (λ_{max}). The latter with maximum intensity is considered for calculation of maturity of the palynomorph.

The normal palynological maceration procedure and slide preparation method has been used for the present investigation. Quantitative spectral analysis of palynomorphs in well E–A (Figure 1) has been carried out as a case study to determine organic matter maturation levels.

Under the present studies only thin-walled, almost psilate pollen, are considered for recording λ_{max}, which is measured from pollen recorded between depth interval 200 to 5074 m and the succession covered ranges in age from Pleistocene to Middle Eocene. Mean vitrinite reflectance values (vR_0) and thermal alteration index values (TAI) recorded are taken from unpublished ONGC reports[2, 3].

λ_{max} recorded from the excited pollen has been tabulated against mean vR_0 and TAI and interpreted maturation levels based on the recorded spectral wavelength (λ_{max}) data are shown in Table 1 and Figure 2. λ_{max} recorded from palynomorphs has been standardized against mean vR_0 recorded from the same samples[2].

These studies indicate the organic matter to be immature in well E–A between depth interval 200 and 4770 m from Pleistocene to Late Eocene with spectral wavelength range of 460–585 nm, vR_0 0.42 to 0.48 and TAI 1.5 to 2.25 (+) (Table 1). Poor organic matter is recorded between depth interval 200 and 4600 m. Moderate to rich organic matter with sapropelic humic facies and TOC range of 0.23 to 0.44 is recorded between 4600 and 4700 m. Spectral wavelength range of 585–590 nm recorded in Middle Eocene sediments between depth 4770 and 5074 m is suggestive of organic matter in the early phase of maturation corresponding to vR_0 value range 0.48 to 0.50 and TAI range 2.25 (+) to 2.5 (Table 1). The sequence is indicative of sapropelic humic facies with moderate to rich organic matter with TOC range of 0.73 to 0.94.

This study holds great promise in elucidating maturation levels from samples lacking *in situ* vitrinite.

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Evidence for the role of wavelengths of light on the reproduction of wild male bird, black-headed munia *Munia malacca*

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Effects of different wavelengths of light (red and blue) and continuous incandescent light (LL) were studied in the seasonal reproduction of black-headed munia. While almost normal gonadal cycle was observed both in red and blue light treated groups, it was abolished under continuous incandescent light. Although red light failed to mimic the effects of continuous light, it could delay the gonadal regression for two months, indicating a better photoperiodic effect than blue light.

REPRODUCTION in most wild birds is known to be regulated by one or more environmental factors. Photoperiod is one such factor which has drawn maximum attention of the avian biologists[1–5]. However, only one aspect of avian photoperiodism, i.e. daylength has been studied in detail. Importance of wavelength has been studied only in very few species and the reports available on this aspect to date are restricted to domesticated species[6–9]. Particularly on wild birds, not a single experimental study has been made. It was therefore considered useful to study the importance of wavelength, if any, in black-headed munia, *Munia malacca* in which reproduction is known to be regulated by daylength[3, 10].

During the first week of December 1989, adult black-headed munia were procured from a local bird supplier and were acclimatized to laboratory conditions for 14 days. The birds were then sexed by laparotomy and only males were used in the experiment. Four groups of 9 each were established in separate wirenet cages (20 × 16 × 14 inches). Birds of group 1 were exposed to continuous illumination (LL) of white incandescent light. Group 2 birds were exposed to red light (RL) through a monochromator filter (wavelength, 760 nm) every day for 6 hours (from 10.30 to 16.30 hour of the day). Group 3 birds were exposed to blue light (BL) through another monochromator filter (W. L. 420 nm) every day for the same duration. These two groups received white incandescent light for the remaining 18 hours of the day as LL group. Group 4, receiving normal day length (NDL) served as a control group. The study was continued for more than one year covering a complete reproductive phase and was terminated in February 1991. Every month the left testis of each bird was measured *in situ* and the gonadal volume was

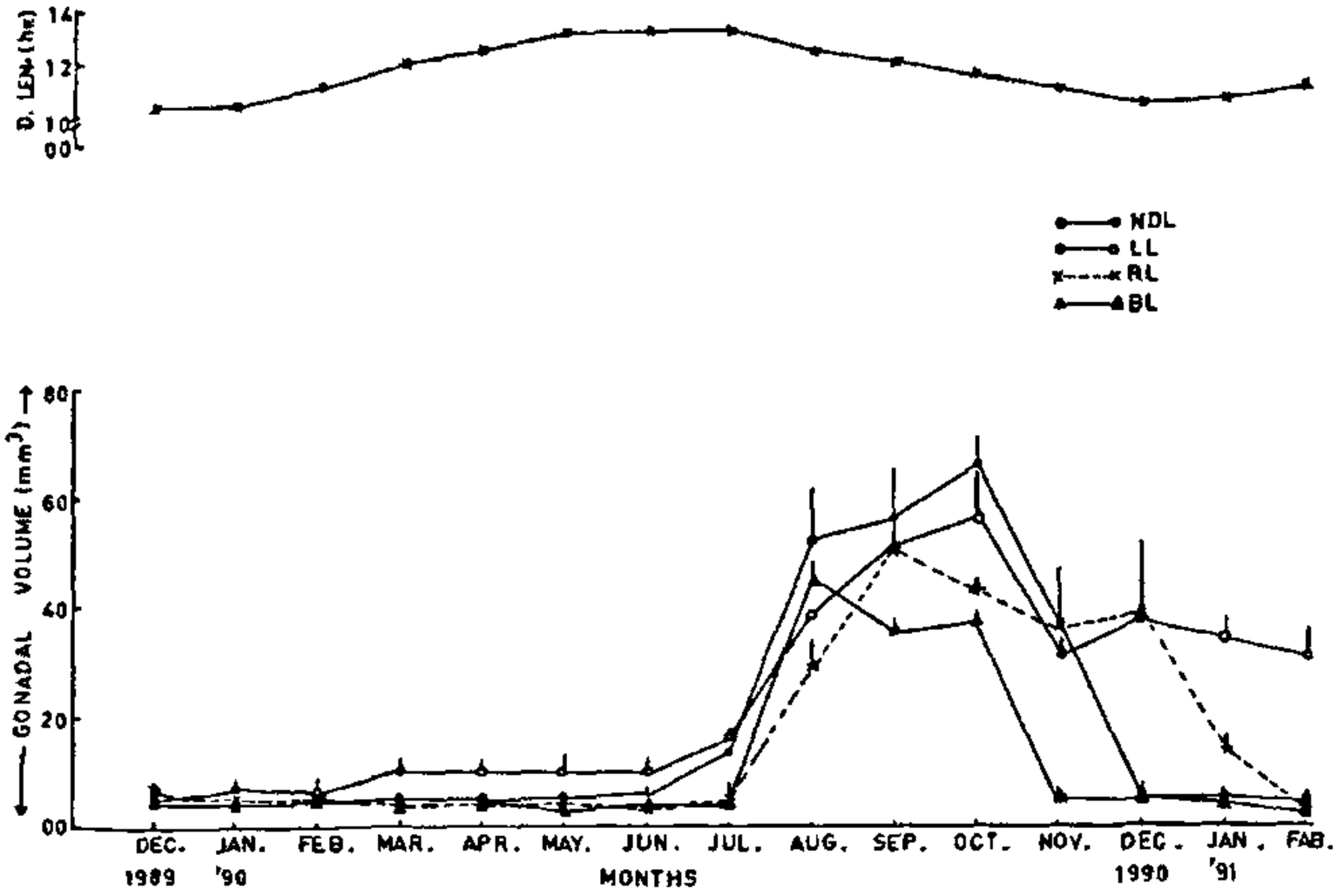

Figure 1. Testicular cycle of black-headed munia, exposed to continuous incandescent illumination (LL), red light (RL), blue light (BL) or natural day light (NDL). Upper panel shows changes in day length during different months of the year in Indore (lat. 22.4 N, long 75 50°E) Vertical lines indicate the standard error of the means.

recorded (calculated from the size of the long and short axes of the testis as recorded by laparotomy). Food and water were provided *ad libitum*. Data were subjected to analysis of variance and where appropriate Student's *t* test was done.

Results are summarized in Figure 1. Annual gonadal cyclicity was observed in all groups of birds except in LL, where testis did not regress completely. In fact, gonadal volume was significantly greater in LL even in the quiescent phase ($P < 0.01$ during March to June 1990, Dec. 1990 and Jan. 1991; $P < 0.001$ in Aug., Nov., 1990 and Feb. 1991 compared to NDL control birds). In these birds a precocious gonadal growth was also noticed ($P < 0.01$ from March to June 1990 compared to the respective values of NDL birds). In red light-treated birds gonadal peak was observed in Sept. 1990 and the regression was delayed up to Dec. 1990. Even in Jan. 1991 testicular volume was significantly greater ($P < 0.01$) compared to the NDL birds. In blue light-treated birds gonadal peak was observed in Aug. 1990 and complete regression was observed in Nov. 1990. When LL and RL birds were compared the testicular volume was significantly greater in LL birds ($P < 0.02$ in March and April 1990; $P < 0.001$ in July 1990, Dec. 1990 and Jan. 1991. In blue light complete gonadal development was not found, as was observed in NDL birds ($P < 0.001$ in July, Oct. and Nov. 1990).

From these observations it is clear that the gonadal cycle was not affected by blue light or red light. However, it was abolished and gonads remained in developed condition even in quiescent months only by continuous light. Although red light failed to mimic LL response it could delay the gonadal regression at least by 2 months indicating a better photoperiodic action than blue light. Similar observations have been made on egg laying of domesticated birds where too red light was more effective[6, 7]. However these studies were made only in domesticated birds. The present finding appears to provide first evidence on the role of light wavelengths in the reproduction of a wild species.

In black-headed munia both long day length (LDL) and continuous light (LL) are gonadostimulatory[10]. However, the importance of different wavelengths was not studied. Our findings clearly indicate that red light is more effective compared to the blue light with respect to testicular development in black-headed munia. Of course, gonadal regression was prevented only by continuous white light. Although wavelength appeared to have little importance in affecting the testicular cyclicity, greater wavelength (RL) indicated a better response compared to shorter wavelength (BL). This could be because of the fact that longer spectrum wavelengths can penetrate more efficiently to the photoreceptor sites as has been suggested earlier[11, 12].

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Colletotrichum falcatum race designation – A methodology

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On the basis of variation in the reaction of *Colletotrichum falcatum* isolates in the set of 13 differentials, viz. SES 594, BO 91, COS 767, COLK 8002, Baragua, CO 7717, CO 975, CO 419, CO 62399, COJ 64, Khakai, CO 1148 and CO 997, two physiological races were identified. The races were designated on the basis of binary and decanary values of infection (spectrum of pathogenicity). The races designated were (i) 7680 from CO 1148 (Haryana), COJ 64 (Lucknow) and COLK 7701 (Lucknow) and (ii) 5920 from CO 7717 (Haryana). The race of higher aggressive nature could achieve higher value of infection.

COLLETOTRICHUM FALCATUM Went, the causal agent of red rot disease of sugarcane, is one of the most distructive pathogens in India. It is a facultative saprophyte and keeps changing in nature due to factors such as hybridization, mutation, heterokaryosis and adaptation. The phenomenon of physiological specialization in *C. falcatum* has been reported by several workers[1–6]. The races of *C. falcatum* have been reported earlier on the basis of fungus morphology that many times do not agree even with the concept of the physiological race[7]. Recently efforts have been made to identify the races on the basis of reactions on tentative differentials[8–12].

There are several methods of nomenclature and designation of races of fungal pathogens. The methodology utilized where genes for resistance in host and genes for virulence in the pathogen are known is considered different than the unknown gene situation. Habgood[13] reported a system of nomenclature in which the race is derived from the spectrum of pathogenicity in different hosts. Nomenclature is made whether or not the genetic basis of resistance in the host has been elucidated. Since sufficient information on the genes for resistance in sugarcane and genes for virulence in *C. falcatum* is not available Habgood's method[13] is being proposed in the present study.

Several isolates of *C. falcatum* were collected and 4 isolates of COJ 64 (Lucknow), COLK 7701 (Lucknow), CO 1148 (Haryana) and CO 7717 (Haryana) were used in this study. Thirteen differentials, viz. Baragua (*Saccharum officinarum*), Khakai, (*S. sinense*), SES 594 (*S. spontaneum*), COS 767, COJ 64, COLK 8002, BO 91, CO 419, CO 975, CO 1148, CO 7717 and CO 62399, were planted in the field condition at Lucknow during the last week of February. Inoculations were made in the second week of August. Twenty five uniform canes of each differential were inoculated by plug method at the third internode. The maximum temperature range was 31–34°C and the minimum 23–26°C. The field was irrigated at the next day of inoculation. The relative humidity was 75–90% during inoculation. The experiments were repeated thrice.

Observations on the disease symptoms were recorded 30 days after inoculation on the basis of 0–9 scale[14]. The reactions of the isolate were limited to resistant and susceptible categories. The differentials were assigned the following grades for their average value of disease index:

Score	*Reaction*	*Notation*
0–4 (white spot absent)	R (Resistant)	0
4.1–9 (white spot present)	S (Susceptible)	I

The differentials were arranged in the fixed liner order. The reaction of each host to a particular isolate was assigned as 0 and 1 depending on resistant and susceptible category. The resulting series of 0 and 1 notation were then considered as a binary number and converted to decanary notation giving a simple unique number for potential race as illustrated below (Table 1). Isolate R-51 is pathogenic on four of thirteen differential hosts namely 10, 11, 12 and 13.

The spectrum of pathogenicity of race 7680 can be simply obtained from its designation. Thus race 7680 $(4096+2048+1024+512) = 2^{12}+2^{11}+2^{10}+2^{9}$ attacks host 13, 12, 11 and 10 only.

The race number of each of the four isolates was calculated on the basis of their reaction on 13 differentials (Table 2). The isolates from CO 1148 (Haryana),