

an expanse of 84mm and females with an expanse of 43mm have an expanse of 97mm. Males with a forewing expanse of 30mm have an expanse of 70mm. These figures indicate that *raya* is rather more variable in size than was previously reported.

Phalera grotei Moore

Horsfield, T. & F. Moore, 1857-59. Catalogue of the Lep. Insects in the Museum of the Hon. East India Co., Vol.2: 434.

Material Examined : 2 ex. : 20.viii. 1996; 6.vii. 1998 Durgapur, Nainital 1700m.

Forewing length : 35 - 38mm.

Known Distribution : Uncertain within India, but extending to Sumatra and Borneo (Holloway 1982).

Remarks : A rare species in the study area. Holloway (1983) notes that it is found at low elevation in Borneo, so perhaps it is commoner at low elevation in Kumaon. According to Holloway (1982), Kiriakoff (1968) gave erroneous distribution for most of the species in this group. The present record probably constitutes the western most limit of its range in the Himalaya as well as an altitudinal record for the species.

Compared with the male illustrated by Holloway (1983), the specimens examined are paler, with the orbicular and reniform as well as the antemedial, postmedial and submarginal markings clearly defined. These markings are obscure in the illustration. Such variation is to be expected from individuals from the drier western Himalaya.

P. grotei can be distinguished from the very similar *raya* in the Himalaya by the vertex of the head being white (brown in *raya*), the forewing *recto* being dark leaden grey (pale silvery grey in *raya*) with a basal suffusion of white scales below the costa which contrasts with the leaden grey on the remainder of the wing. The buff apical patch is proximally rounded as in *raya* and the postmedial lunulate band is continued through the buff sub-apical patch as a paler brown, lunulate band to the costa. This is not prominent or altogether obsolete in *raya*.

Discussion

The four species of *Phalera* discussed above have all been recorded from a single location. Given the varied topography and vegetation types that are met within Kumaon, it is not unlikely that one or more species of this genus will be added to the known fauna when a thorough survey is undertaken. None of the new records appear to be recent introductions to the area and the reason that these were not previously recorded is probably the lack of collections from below 1600m in the area.

As is to be expected in insects from the drier western Himalaya, the individuals are paler than eastern and southern Indian populations, so that the markings are clearer. This tendency is also evident in such diverse groups as the Neptini (Nymphalidae), *Delias* Huebner (Pieridae) and *Aglais* Dalman (Nymphalidae) among others.

In the matter of size, there is some inconsistency, with *parivala* smaller and *procera* and *raya* larger than eastern and southern Indian populations. All the species appear to be univoltine and on the wing during the wettest part of the year. These moths are commoner in years of heavy rainfall and rather scarce in drought years.

During daylight hours, they depend entirely on their very effective camouflage for survival. They do not have the ability to "make a quick getaway" as do most Noctuids and even some Notodontids, but have to unroll their wings and vibrate them in order to achieve flight temperature.

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EFFECT OF AMBIENT AIR AT SEWRI, BOMBAY, ON POLLEN VIABILITY OF SOME ANGIOSPERMIC PLANTS

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Pollution is now the most important limiting factor for man. In the underdeveloped nations shortage of available food and resources is associated with chronic pollution and disease caused by human and animal wastes, while in the affluent or developed nations agroindustrial chemical pollution is now more serious than organic pollution. In addition, global

pollution of air and water mostly emanating from the developed countries threatens every one (Odum, 1971).

Pollen development and activity are among the sensitive indicators of adverse factors in Botanical environment, perhaps because they are haploid.

The survey of the past work indicates that it was Sulbha Rane (1988), Sebastin (1988) and Mohd. Anis (1989) who studied the effect of industrial pollution on the pollen viability. More work in the field will throw some additional light; with this in mind the present work was undertaken.

Effect of ambient air at Sewri on pollen viability of 21 angiospermic plants forms the subject of the present investigation. Sewri is a heavily industrialised area of Greater Bombay located in 'F' South ward. Most of the Petroleum installations like Bharat Petroleum Corporation Ltd., Indian Oil Corporation Ltd., Hindustan Petroleum Corporation Ltd., and Indo Burma Petroleum Ltd., are located in this area. In addition to these installations, notable industries such as Colgate Palmolive and Vegetable oils are also located here.

The effect of industrial pollution on pollen viability of the following plants was studied:

(1) *Bougainvillea spectabilis* Willd. (red flowered), (2) *B. spectabilis* Willd. (white flowered), (3) *Brassica juncea* Crass., (4) *Canna indica* L., (5) *Clerodendron inerme* Gaertn. Fruct., (6) *Clitoria ternatea* L. (white flowered), (7) *C. ternatea* L. (purple flowered), (8) *Hibiscus rosasinensis* L., (9) *Ipomea palmata* Forsk., (10) *Ixora coccinea* L., (11) *Lantana camara* L. (pink flowered), (12) *L. camara* L. (yellow flowered), (13) *Mangifera indica* L., (14) *Malvaviscus arboreus* L., (15) *Moringa pterygosperma* Goertn. Fruct. V., (16) *Mussaenda frondosa* L., (17) *Peltophorum ferrugineum* Benth., (18) *Portulaca grandiflora* Hook., (19) *Tabernaemontana coronaria* Willd., (20) *Thespesia populnea* Sol., (21) *Tridax procumbens* L.

Pollen viability was tested by using 2,3,5-triphenyl tetrazolium chloride (Hauser & Morrison, 1964). Ten or more random fields all over the slide were counted, making total of 500 pollen grains.

Ambient air at Sewri inhibited pollen viability in all the plant species studied. Industrial pollution at Andheri (Sebastian, 1988), Lalbaug (Sulbha Rane, 1988) and Chembur (Mohd. Anis, 1989) also inhibited the pollen viability. In the present investigation ambient air at Sewri caused maximum inhibition in pollen viability of *Moringa pterygosperma* (Table 1). This proves that pollen of *M. pterygosperma* are highly sensitive and can be used as an ideal air monitor.

Table 1. Effect of Ambient Air At Sewri on Pollen Viability of Some Angiospermic Plants

Species	(Values given are mean \pm SE of 500)	
	% Pollen viability	
	From unpolluted atmosphere	From polluted atmosphere
<i>Bougainvillea spectabilis</i> (red-flowered)	79.80 \pm 0.97	68.00 \pm 1.13
<i>Bougainvillea spectabilis</i> (White-flowered)	77.40 \pm 0.74	68.20 \pm 0.71
<i>Brassica juncea</i>	74.00 \pm 1.24	60.00 \pm 2.35
<i>Canna indica</i>	75.60 \pm 1.31	68.80 \pm 1.92
<i>Clerodendron inerme</i>	79.80 \pm 1.18	66.80 \pm 2.85
<i>Clitoria ternatea</i> (white-flowered)	75.00 \pm 1.82	70.00 \pm 1.82
<i>Clitoria ternatea</i> (purple-flowered)	78.00 \pm 0.08	65.60 \pm 3.32
<i>Ipomea palmata</i>	89.40 \pm 1.53	71.00 \pm 3.10
<i>Ixora coccinea</i>	77.80 \pm 1.57	74.40 \pm 1.78
<i>Lantana camara</i> (pink-flowered)	61.60 \pm 1.55	55.61 \pm 1.31
<i>Lantana camara</i> (yellow-flowered)	67.20 \pm 2.29	54.40 \pm 1.09
<i>Mangifera indica</i>	83.60 \pm 0.74	72.20 \pm 0.57
<i>Malvaviscus arboreus</i>	54.00 \pm 3.40	51.85 \pm 1.62
<i>Moringa pterygosperma</i>	78.40 \pm 1.77	61.80 \pm 4.66
<i>Mussaenda frondosa</i>	79.40 \pm 0.90	74.00 \pm 1.44
<i>Peltophorum ferrugineum</i>	87.61 \pm 5.41	70.51 \pm 4.14
<i>Portulaca grandiflora</i>	74.40 \pm 1.12	62.40 \pm 2.08
<i>Tabernaemontana coronaria</i>	76.00 \pm 1.94	67.00 \pm 3.09
<i>Thespesia populnea</i>	78.00 \pm 1.40	68.40 \pm 1.77
<i>Tridax procumbens</i>	76.80 \pm 1.06	71.20 \pm 1.41
<i>Hibiscus rosa-sinensis</i>	65.00 \pm 1.24	62.60 \pm 0.65

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OCCURRENCE OF GREAT CRESTED GREBE, *PODICEPS CRISTATUS CRISTATUS* (LINN.) IN KONDAKARLA LAKE, VISAKHAPATNAM DISTRICT, ANDHRA PRADESH

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The Great Crested Grebe *Podiceps cristatus cristatus* (Linnaeus), is a rare winter visitor to Northern India and Pakistan, from Sind to Assam and Manipur. It is known to occur in Rajasthan and Gujarat in the west and Orissa in the east (Ali & Ripley, 1987). Even though this bird was reported earlier in Andhra Pradesh (Krishna Raju, 1983; Taher & Pittie, 1989) at Thadipudi near Visakhapatnam, no recent sight record has been reported.

Our team conducted limnological and biodiversity studies during 1996-1998 on the Kondakarla Lake, which is a natural shallow freshwater lake, situated about 40km southwest of Visakhapatnam city, in between latitudes 17°35'30" and 17°36'02"N and 82°59'27" and 83°01'0"E longitude. On 29th December 1997 the author had an opportunity of observing five Great Crested Grebe on the lake near Gollalapalem area, with large number of other teals like Coot, *Fulica atra* (more than 300), Red Crested Pochard, *Netta rufina* (120*), Shovellers, *Anas clypeata* (60*), Common Pochard, *Aythya ferina* (25*) and other unidentified teals (100*). In a close view with the binoculars, their humpbacked appearance, long slender neck and their striking plumage were immediately recognizable. Interestingly all the grebes were in winter plumage, without long ear tufts, and in bright adult plumage. These birds were seen feeding most of the time in the area, where the submerged macrophytes like *Chara vulgaris* and *Hydrilla verticillate* were in abundance. The next day these birds were observed again near Waadrepally area of the lake.

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EFFECT OF ROOT-KNOT NEMATODE ON WILT OF TOMATO

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The roots of crop plants are constantly exposed to many soil micro-organisms, and infection by one pathogen may alter the host response to subsequent infection by another (Taylor, 1970). *Fusarium solani* causing tomato wilt is one of the most important soil borne organism and its infection causes heavy crop losses. The development of fusarium wilt disease has been reported to be enhanced by the infection of root-knot nematode (Mai & Abawi, 1987). In nature, root-knot nematode *Meloidogyne incognita* and the fungus *F. solani* have been found associated with tomato. In such situation the losses to tomato become much more. It is not known whether there is any relationship between the two organisms. The present investigations are made to determine the relationship between *M. incognita* and *F. solani* on tomato.

The inoculum of the fungus was raised on potato dextrose broth at 28°C (Riker & Riker, 1936). The fungus was grown in 250 ml Erlenmeyer flask and the inoculum was used for inoculation. The plants were inoculated with blended fungal mat @ 2g/pot. The inoculum of root-knot nematode was raised from single eggmass on tomato. The plants were inoculated with 1000 J₂ second stage juveniles.