



Fig. 2. Occurrence of different blast pathogen lineages in three different blast epidemic outbreaks at Banki, Dhenkanal, and Berhampur in the state of Orissa.

Isolates of *Pyricularia grisea* collected from farmers' fields in epidemic regions for comparative study.

Site	District in Orissa	Ecosystem	Season ^a	Rice genotypes	No. of isolates		
					Tissue		Total
					Leaf	Neck	
Banki	Cuttack	Rainfed upland	1997 WS	Laghubhutia and Golabondi	–	29	29
Dhenkanal	Dhenkanal	Rainfed upland	2000 WS	Latamohu and Dhala Heera	31	–	31
Berhampur	Ganjam	Rainfed upland	2002 WS	Swarna	43	–	43
Total					74	29	103

^aWS = wet season.

Record of a hyperparasitoid on *Pseudogonatopus nudus* Perkins (Dryinidae: Chrysidoidea) parasitizing *Nilaparvata lugens* (Stål) from Asia

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Plant- and leafhoppers of rice are well-recognized noxious pests and severe populations have often caused serious rice yield losses. Many natural enemies are reported on these hoppers in rice. Among the parasitoids, mymarids and trichogrammatids

are the most common. The rest of the parasitoids, dryinids, pipunculids, strepsipterans, and vellids, are unstable but still contribute to the biological management of hoppers.

In a routine attempt to collect dryinids, parasitized brown

planthopper (BPH) and green leafhopper (GLH) nymphs and adults showing the larval sac protrusion symptom were collected during the 2004 Kuruwai crop (July-Sep). They were transferred to potted plants under greenhouse conditions and reared till

the matured dryinid larvae came out and pupated on the surface of the culm region. Surprisingly, from a few pupae of dryinids, instead of dryinid adults emerging, other parasitoids came out. Later, these parasitoids were identified as *Cheiloneurus exitiosus* (Perkins) [*Echthrogonatopus nigricornis* (Hayat) is a synonym] belonging to the family Encyrtidae. It is a larval-pupal parasitoid. This hyperparasitoid on dryinid (*Pseudogonatopus nudus*) Perkins, seems to be the first record from Asia.

This encyrtid hyperparasitoid was reared in the laboratory on 50% honey solution and its oviposition behavior and host preference were studied and photographed (Nikon Coolpix 5400 using macro-close-up option) on *P. nudus* (see figure). The mated female preferred to oviposit in later instars of *P. nudus* larva through the larval sac. One day after parasitization, the matured dryinid larva came out of the larval sac and pupated. From a single dryinid pupa, four encyrtid parasitoids emerged.

The total life cycle took about 14 d, starting from egg laying

through the larval sac until adult emergence. The hyperparasitoid spent nearly 2 d in the larval stage of dryinid and the remaining period in the pupal stage. The adult took totally 1 min and 55 s from insertion of the ovipositor to withdrawal after egg laying. This process was repeated three times by the same adult in the same host but at different locations of the larval sac. The timings in the subsequent ovipositions were 1 min 10 s, 55 s, and 20 s, respectively. However, it is yet to be confirmed whether the encyrtid laid all four eggs during the first insertion or laid one egg during each insertion at different locations of the larval sac. The male and female adult parasitoids survived for 10 and 14 d, respectively. The sex ratio observed was either 1:3 or 2:2.

The type species of *Echthrogonatopus*, *E. exitiosus* Perkins, has been recorded from a dryinid (*Gonatopus* sp.) from Australia (Perkins 1906). In India, *E. nigricornis* (Hayat) was originally described by Hayat (1980) in the genus *Metapterencyrtus*, but in the same paper, Hayat (1980 : p.645) transferred this species

and parvus to *Echthrogonatopus*. However, no host was recorded until 2002. Behera et al (2002) have reported *E. nigricornis* as a hyperparasitoid of *Goniozus* sp. (Bethyridae: Hymenoptera) parasitizing rice leaffolder *Cnaphalocrocis medinalis* (Guenée) from India. Guerrieri and Viggiani (2004), in their review of the encyrtid parasitoids of Dryinidae, have reported the genera *Cheiloneurus* and *Helegonatopus* and 31 species as hyperparasitoids, and further synonymized *Echthrogonatopus* with *Cheiloneurus*, and *E. nigricornis* with *exitiosus*.

This hyperparasitoid may be responsible for the reduced effectiveness of dryinids, thereby allowing the hopper population to flare up and sporadically cause hopperburn.

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Hyperparasitoid, *Echthrogonatopus nigricornis* (Hayat) parasitizing through the larval sac of *Pseudogonatopus nudus* Perkins on *Nilaparvata lugens* (Stål).