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RESEARCH ARTICLE

First report of *Lycoriella* sp. on oyster mushroom from North East India

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ABSTRACT

A new dipteran pest, fungus gnat (*Lycoriella* sp.) was recorded on oyster mushroom (*Pleurotus ostreatus* Jacq.ex Fr.) during the month of April–May, 2012. A single larva could damage 20-35 per cent of a fruit body within 3-4 days of infestation. In severe infestations, it damaged 70-80 per cent of the fruit bodies in mushroom beds. Hence, looking at severity of infestation, certain aspects of its biology were studied under laboratory condition (Temperature 27-31^{0}C, RH 82-88%). The female laid round, white or translucent eggs singly or in groups on the upper part as well as stalk of the mushroom fruit bodies. The pre- and post oviposition and incubation period periods were 5-6 days, 2-3 days and 3-4 days, respectively. Maggots were white in colour and vermiform, with a conical head possessing a pair of sclerotized, black and pointed mandibles. There were four larval instars and total larval period was 10-13 days. The body length of the instars I, II, III and IV were 4.06±0.22 mm, 5.46 mm±0.12 mm, 8.56 ±0.00 mm and 9.60±0.01 mm, respectively Pupae were coacrtate, brown in colour, 9.20±0.02 mm in length and pupal period was 3 days. The adult fly had a shiny black head, long antennae, long legs and transparent thin wings with distinct venation.

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INTRODUCTION

The climatic condition of Assam is congenial for the year round production of oyster mushroom (*Pleurotus ostreatus* Jacq.ex Fr.). The oyster mushroom is popular among the farmers of North East India because of its easy cultivation practices, substrate availability and better shelf-life, besides being a protein rich food having resemblance to meat. The occurrence of pests like insects, mites and diseases is considered as one of the major limiting factors of mushroom cultivation in Assam. Among the insect pests, cecid fly, staphylinid beetle, phorid fly were reported from different parts of the country including Assam (Mazumder *et al*., 2008). Several workers reported incidence of different pests on mushroom at different times of the year. During April –May, 2012, a species of fungus gnat *Lycoriella* was recorded heavily infesting the oyster mushroom crop in the mushroom cultivation house of Department of Plant Pathology, Assam Agricultural University (AAU) Jorhat, Assam. Looking at the severity of infestation, it was considered essential to study the certain aspects of its biology under laboratory conditions (temperature 27-31^{0}C, RH 82-88 %) during April –May, 2012.

MATERIAL AND METHODS

Newly hatched maggots of *Lycoriella* sp. found infesting the fruit bodies of oyster mushroom in the mushroom beds of the Mushroom Cultivation House, Department of Plant Pathology, AAU, Jorhat were collected. Collected maggots were reared in Petriplates (15 cm diam.) containing fresh mushroom fruit bodies. Renewal of fresh mushroom as food for the maggots was done at an interval of 5-6 days till they

entered pupation. Cast off head capsules and exuviae were recorded in order to ascertain the number of larval instars. As the mature maggots slowed down feeding activity and approached pupation, the Petriplates were covered with lantern chimneys (22 cm × 10 cm). The open mouth of each chimney was covered with muslin cloth and rubber band. This rearing assembly was left undisturbed (without food renewal) till pupation was over and adults started emerging. Observations were taken on number of instars, larval period, pupal period and adult emergence. The emerged adults were carefully transferred to a fresh set of lantern chimneys (22 cm × 10 cm) kept as oviposition cages. Cotton swabs soaked in honey solution (10%) were provided as food for the adults. The adults were allowed to mate inside the lantern chimneys for egg laying. Fresh fruit bodies were introduced into the chimney as oviposition substrate for the mated females. Observations on mating, oviposition, fecundity, incubation period and adult longevity were taken. General morphological features of the life stages were recorded and morphometrical measurements were taken with stage and ocular micrometer.

RESULTS AND DISCUSSION

The eggs were laid singly on the upper part as well stalk of the mushroom fruit bodies. Egg was round, white or translucent, and with a dark coloured spot (Fig. 1a, 1b). Pre-oviposition period and oviposition period were 5-6 days and 2 -3 days, respectively. Incubation period was 3-4 days. Most of the eggs laid by a female hatched almost simultaneously on the same day. In absence of adequate number of fruit bodies, the gravid female also laid eggs in masses (Fig. 2a, 2b). There were four larval instars. Maggots were translucent

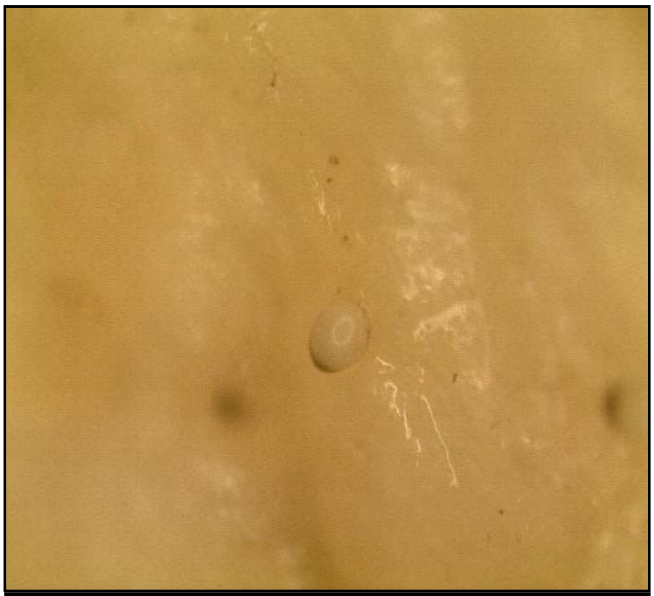

Fig. 1a: A single egg on mushroom cap

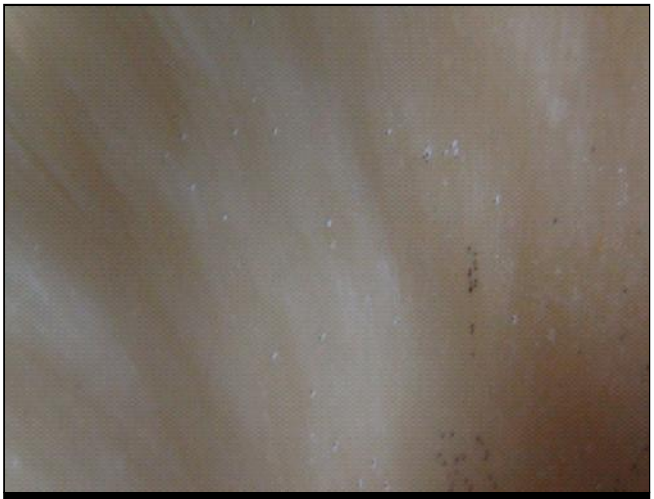

Fig. 1b: Scattered eggs on mushroom cap

Fig. 2a: Mass of eggs laid on decayed mushroom gills

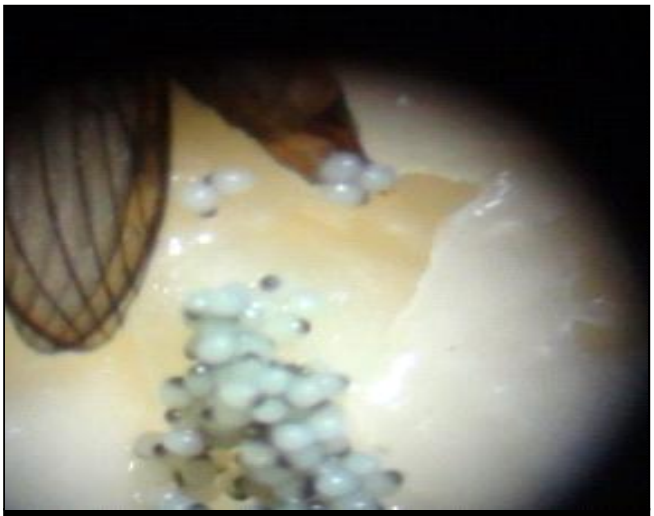

Fig. 2b: Mass of eggs laid on decayed mushroom

in colour and vermiform, with a conical head possessing a pair of sclerotized, black and pointed mandibles (Fig. 3a, 3b). The body lengths of the instars I, II, III and IV were 4.06±0.22 mm, 5.46 mm±0.12 mm, 8.56 ±0.00 mm and 9.60±0.01 mm, respectively. The colour of the instar IV maggot changed to dark green before pupation. Total larval period was 10-13 days. The maggots fed on the stalks and caps of the mushroom fruit bodies. The early instars (I and II) chewed the tissues of the upper surface of cap and stalks with their sclerotized mandibles. It is because of the movement of the mandibles and the head that the presence of the maggot could be visible with naked eye, while the remaining portion of the translucent body remained almost invisible. Instar III maggots were more active and readily moved among the fruit bodies, greedily feeding on the gills. The fourth instar maggots also fed voraciously. When full-fed, the major part of its abdomen looked black due to the gut contents and became less active. When fully matured, the maggots pupated among the gills or on the stalk of the decaying fruit bodies. Pupae were coacrtate, brown in colour, 9.20±0.02 mm in length (Fig. 4). Pupal period was 3 days. The adult flies emerged in the evening hours and they resembled mosquitoes. The adult was small (7.10-8.00 mm long); had a shiny black head; long antennae; long legs; and transparent, thin wings with distinct venation (Fig. 5). Adults did not feed on the fruit bodies but fed on honey solution (10%) and water (Fig. 6). The abdomen of both male and female had alternate bands of dark brown and light yellow colour (Fig. 2a). Female was slightly more slender and longer than the male.Mating took place inside the chimney during day time and it lasted about 30 min. (Fig. 7). A single female

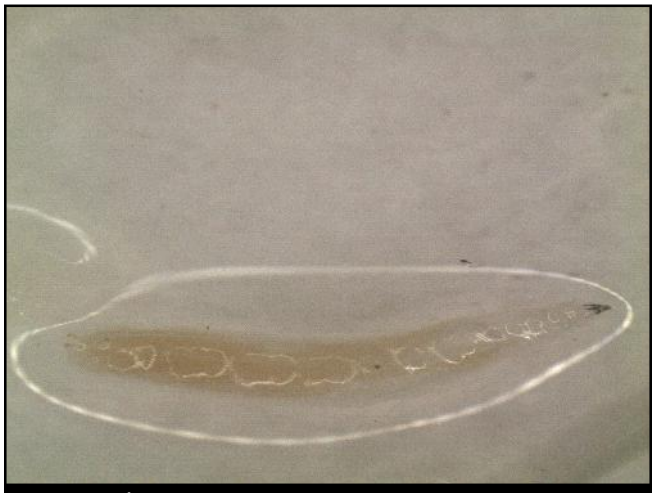

FIg. 3a: 3rd instar larvae with conical head and black sclerotized mandible

Fig. 4 : Larvae ready to pupate on infested mushroom

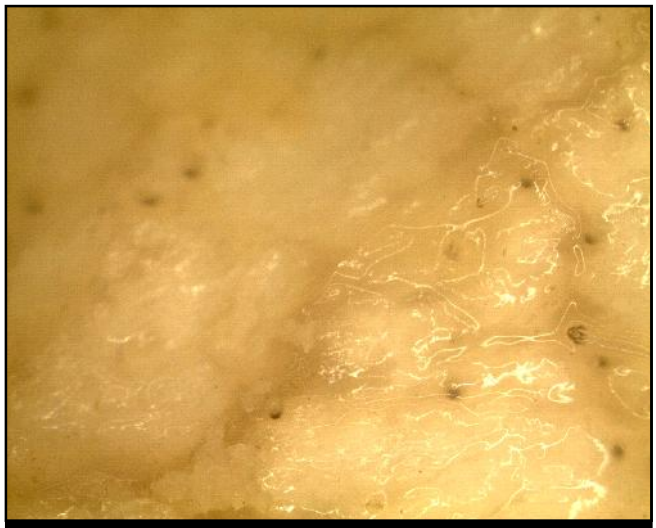

Fig. 3b: 1st instar larvae with distinct mandible and head on upper surface of cap

Fig. 5 : Wing of adult *Lycoriella* sp.

could lay up to 215 eggs in her life time. Adult longevity was 5-6 days. The life cycle from egg to adult took 17-22 days under laboratory conditions. The maggots caused damage by chewing and feeding voraciously on the caps and stalks of the fruit bodies. Second and third instars maggots proved to be highly destructive to the mushroom. Infested mushroom fruit bodies started rotting with stale odour and became unsuitable for human consumption. A single larva could damage 20-35 per cent of a fruit body within 3-4 days of infestation. In severe infestations, it damaged 70-80 per cent of the fruit bodies in mushroom beds. The infestation was brought under control by spraying azadirachtin 1.5 @ 3ml/l of water.

Fig. 6a : Adults feeding on honey solution from cotton swab

Fig. 6b : Adults Lycoriella sp. on mushroom cap

Fig. 7 : A pair of adults in copulation

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