

THE FUNGUS *PHALLUS RUBICUNDUS*: POSSIBLE ATTRACTANT AND BIO-CONTROL AGENT FOR MOSQUITOES

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Fungi of the order Phallales (stinkhorns) are known to attract flies, beetles and termites. Eggs and mature fruiting bodies of these fungi produce a carrion-like smell, which presumably is the attractant. During this study it was observed that the mosquitoes (*Culex* spp.) were attracted to the dissected eggs of *Phallus rubicundus* and subsequently died after feedings on the deliquescent glebae of eggs. This group of fungi should be further investigated for possible mosquito attractant or bio-chemical compounds.

Key words: *Phallus rubicundus*, Mosquito, Attractant.

Introduction

Esenther *et al.* [1] and Kovoov [2] demonstrated that termites are attracted to wood inoculated or decayed with the fungus *Lenzites trabea* Pers. ex. Fr. a member of the family Polyporaceae order Aphyllophorales. Oso [3] observed flies and blue beetles hovering around the fungus *Phallus aurantiacus* Mont. and eventually settling on the cap where they consumed the spores and exposed the receptacle. Nicholson and Brightman [4] reported that fetid stench of *Phallus impudicus* L. ex. Pers. attracts flies, feed on the slime and distribute the spores to the places where they reach. Neuner [5] reported that the cap of *P. impudicus* fungus is covered with a offensive smelling slime, which attracted flies and dung beetles. Flegler [6] developed a method for production of *Mutinus caninus* (Pers.) Fr. (order Phallales) fruit bodies in culture and observed several large eggs developed 30-40 days and fruited 50-60 days after casing. Kibby and Milne [7] reported that the spore mass of *P. impudicus* liquefies to produce an obnoxious and extremely penetrating smell which attracted flies.

This study reports that the mosquito (*Culex* spp.) and fly (*Simulium indicum* Becker) are attracted to glebae of dissected eggs containing spores of fungus of *P. rubicundus* (Bosc.) Fr. Mosquitoes and flies observed feeding on the glebae, of fungus went in comma and subsequently died.

Materials and Methods

Eggs of *P. rubicundus* were found growing naturally in different habitats at Rawalakot, Azad Kashmir, during fruiting season (Aug.-Sep. 1991). Among them three eggs lived in the soil 2-5 weeks afforded ample opportunity to study their development. Sites containing eggs of *P. rubicundus* were observed thrice daily (morning, afternoon and evening). Eggs and mature fruiting body were subsequently collected and brought to the laboratory. Dried mature fruiting body was placed and preserved in a glass jar and young stage fruiting

bodies (eggs) were dissected and placed on a wooden table in the artificial light outside the laboratory of Plant Pathology, University College of Agriculture, Rawalakot, at the evening and during night, where data regarding attraction, feeding and death of mosquitoes and flies was recorded. Photographic record was also made in the laboratory.

Results and Discussion

During taxonomic studies on the order Phallales three eggs of *P. rubicundus* were seen at the bank of a brook near the stump of barberry bushes at the end of the rainy season (13 Aug.-16 Sept. 1991). These eggs remained in the soil for two weeks when rains stopped abruptly and fruiting bodies did not develop from them during this period but after two weeks peridium of one egg ruptured and a mature fruiting body emerged. One important character observed here was that remnant of the volva covered a portion of pileus, which is not a common character of this species. The gleba and receptacle were autodigested when specimen was fresh but when they dried naturally, digestion stopped and they had an offensive carrion-like smell.

Two eggs remained in the soil for a further three weeks. During this period there was no rainfall and fruiting bodies did not develop. The eggs were dug out and brought to the laboratory and after their dissection they were placed on a wooden table in artificial light at evening and during night to study the behaviour of insects. One egg was completely dried in the soil naturally with its stipe, cut longitudinally, receptacle and gleba were dried inside the peridium and deliquesced completely but mosquitoes and flies were attracted to its gleba (Fig. 1).

When a longitudinal section of another living egg was taken the gleba was observed to be deliquescent. This autodigestion was accelerated after its dissection (Fig.2) and mosquitoes (*Culex* spp.) attracted to it naturally and fed on the

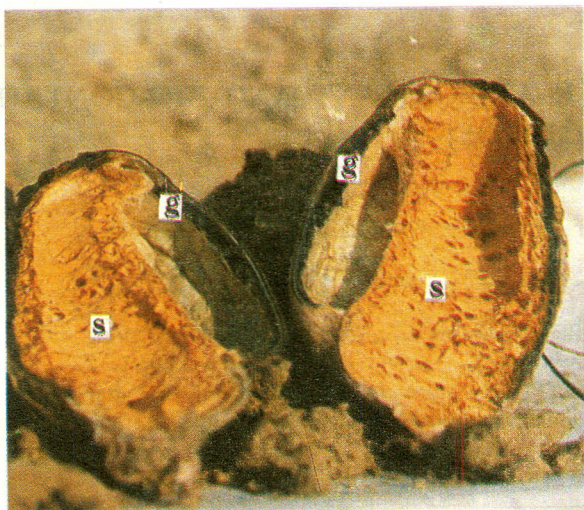


Fig. 1. Eggs of *P. rubicundus*. s= Dried stipe in the egg. g= Completely deliquesced gleba x 1.

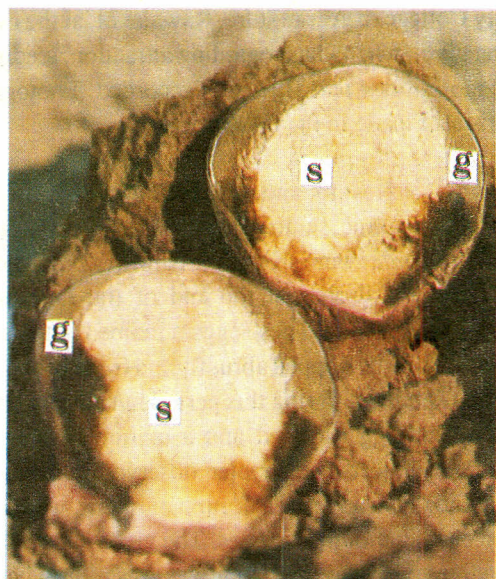


Fig. 2. Eggs of *P. rubicundus*. S= Living stipe in the egg. g= Deliquescing gleba of the egg, showing attraction and mosquitocidal activities x 3/4.

poisonous surface of the autodigested gleba, went in comma, fly at a distance of 2- 8 cm. and finally died within 2-15 min.

TABLE 1. PERCENTAGE MORTALITY OF MOSQUITOES (*CULEX* spp.) AND FLY (*SIMULIUM INDICUM*) FEEDING ON THE EGGS OF *P. RUBICUNDUS*.

Time hr.	Mosquitoes (<i>Culex</i> spp.)				Fly (<i>Simulium indicum</i>)			
	Attracted	Feeding	Death	%age	Attracted	Feeding	Death	%age
12	15	15	13	86.67	x	x	x	x
24	11	11	09	81.82	20	20	15	75.00
48	08	08	04	50.00	16	16	10	62.50
72	07	07	03	42.86	10	10	04	40.00
96	05	05	01	20.00	07	07	02	28.75
Total	46	46	30	65.22	53	53	31	58.49

Flies were not observed during first 12 hr. After 12 hr. this egg was partially dried in the sun and still attracted and killed mosquitoes as well as fly (*Simulium indicum*). Both species died after feeding on the fungus. There effects continued until 96 hr. (Table 1). The smell of this egg was similar to the mature fruiting bodies of stinkhorns.

Fungi of the order Phallales are known to attract a variety of insects, but study is the first to demonstrate attractiveness to a mosquito (*Culex* spp.). This fact and the observed mortality of mosquitoes seen feeding on the eggs of *P. rubicundus* demonstrate a need to grow the fungus artificially in controlled environment to study these aspects of Phallales further.

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