maize *Zea mays* L. by noctuid pod borer *Heliothis armigera* (Hb.) and on pearl millet *Pennisetum americanum* (L.) by *H. armigera* and noctuid millet spike worm *Raghuva albipunctella* de Joannis further accentuated production deficiencies. One of the main causes of these pest problems is the rapid depletion of natural enemies as a result of prolonged drought and an alarming increase in the use of subsidised pesticides in Senegal[2].

Entomological surveys on noctuid and pyralid pests on food crops in Senegal resulted in the recovery of seven species of *Cardiochiles* (table 1). Of these two new records are *Cardiochiles variegatus* Szepligeti attacking early instar larvae of both *H. armigera* and *R. albipunctella* and *Cardiochiles sahelensis* sp.n. attacking early instar larvae of only *R. albipunctella*. In view of the high level of natural control of *H. armigera* larvae by *C. variegatus* in the drought hit Sahel, an efficient searching capability of early instar host larvae by the parasite adults in dry land cereals and grain legumes[3] and with the absence of any species of *Cardiochiles* on *H. armigera* in the Indian sub-continent, *C. variegatus* becomes a highly potential biological control candidate for import against *H. armigera* on grain legumes in India.

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MANAGEMENT OF RESISTANCE IN *PYTHIUM APHANIDERMATUM* TO ALUMINIUM ETHYL PHOSPHITE

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CONTINUOUS use of fungicides in spray programmes may develop resistance in the pathogens under selection pressure and a fungal strain may develop which is simultaneously resistant to two site-specific inhibitors with different modes of action[1]. If, under the selection pressure of one such substance, specifically resistant strains accumulate in a fungal population, their further reproduction may be prevented by the simultaneous use of another chemical. Hence, alternate and combined use of conventional fungicides such as copper oxychloride, ziram and mancozeb was made in order to see the development of resistance to aluminium ethyl phosphite in *Pythium aphanidermatum*.

Poisoned food technique was used to study the effect of continuous and alternate treatments with two fungicides and a mixture of both on the development of fungicide resistance in *P. aphanidermatum*. The resistant strain of *P. aphanidermatum* (UVPA) was cultured for five successive passages on glucose nitrate agar plates containing 2X MIC of aluminium ethyl phosphite (3000 μg/ml), aluminium ethyl phosphite alternating with copper oxychloride (1500 μg/ml), ziram (10 μg/ml) and mancozeb (1500 μg/ml) and a mixture of aluminium ethyl phosphite and the above mentioned fungicides one at a time. All concentrations were used on active ingradient basis[2]. The resistant strain of the pathogen was developed through UV irradiation of wild sensitive isolates. MIC of wild sensitive isolates was 1500 μg/ml. The mycelial suspension exposed to UV (for 30 min at 10 cm distance) was plated onto the agar medium containing 2X MIC of aluminium ethyl phosphite. Colony growing on this 2X medium was considered to be that of the resistant mutant. Concentrations (a.i.) of the conventional fungicides used are generally recommended for the management of diseases of various crop plants[3]. In each passage, linear mycelial growth was measured after 12 days. The increase in the mycelial growth from passage to passage was employed as the criterion for the development of resistance.

When *P. aphanidermatum* was treated continuously with aluminium ethyl phosphite, the resis-

Table 1 *Effect of alternate exposure of Pythium aphanidermatum to aluminium ethyl phosphite (AEP) and other fungicides on agar plates*

Fungicides alternate to AEP(3000 μg/ml)	Passage number				
	1	2	3	4	5
Copper oxychloride (1500 μg/ml)	31*	15 0	26 1	23.8	20 2[a]
Ziram(10 μg/ml)	31	10.5	24.0	20.7	18 5[a]
Mancozeb (1500 μg/ml)	31	20.0	28 5	26.2	22.5[a]
Continuous treatment with AEP (3000 μg/ml)	31	36.8	40.1	45.4	50.2[b]

*Linear growth (mm), [a]Significant decrease, and [b]Significant increase over first passage by Wilcoxon's sum rank test ($P = 0.01$).

tance kept increasing at every successive passage and was maximum at the fifth passage. Alternate treatment with fungicides significantly reduced the resistance from passage to passage[4,5]. Maximum reduction was observed with ziram followed by copper oxychloride and mancozeb (table 1). As is evident from table 2, treatment with a mixture of fungicides resulted in the increase in resistance of the pathogen up to five successive passages and this increase was maximum in mancozeb followed by copper oxychloride and ziram but was still significantly less when compared with the passage on only aluminium ethyl phosphite. Combination of different fungicides has been suggested for managing the level of fungicide resistance in pathogens by earlier workers[6]. Hence, aluminium ethyl phosphite resistance in *P. aphanidermatum* may be managed to a certain extent by the alternate and combined use of the above mentioned conventional fungicides.

Table 2 *Effect of exposure of Pythium aphanidermatum to the mixture of aluminium ethyl phosphite (AEP) and other fungicides on agar plates*

AEP(3000 μg/ml) + other fungicides	Passage number				
	1	2	3	4	5
Copper oxychloride (1500 μg/ml)	10*	12.2	14.5	17.2	20.0*
Ziram(10 μg/ml)	9	11.5	13.8	16.5	18.1**
Mancozeb(1500 μg/ml)	15	16.3	18 0	20.2	23.2**
AEP alone	31	36 8	40 1	45.4	50 2**

*Linear growth (mm), **Significant increase over first passage by Wilcoxon's sum rank test($P = 0.01$).

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A NEW SPECIES OF LICHEN GENUS *PHYLLISCUM* FROM INDIA

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INVESTIGATIONS on lichens collected from the environs of Lucknow have led to the discovery of many interesting taxa. The lime plaster of the walls of old building, of which Lucknow has in plenty, provide the suitable niche for lichens belonging mainly to the families Dermatocarpaceae, Lichinaceae and Heppiaceae. Singh and Upreti[1] described six species of *Endocarpon* among which 4 are new species collected from the same substratum. Many more taxa of lichens from this niche await descriptions. This note deals with one of them which happens to be a new species.

Phylliscum indicum Upreti sp. nov.

Thallus calcicola, atrofuscus, squamulosus; 0.5–1.5 mm latus. Apothecia immersa vel leviter emergentia, 0.5–0.7 mm lata; margine thallino, disco concavo. Asci cylindracei, 8-spori, sporae simplices, ecoloratae, ovoideae vel ellipsoideae, 17–25 × 9–11 μm. Paraphyses simplices vel ramoso-connexae. Phycobiont ad chroococcaceas pertinens.