The author is grateful to Prof. K. S. Bhargava for his guidance and keen interest in problem. He is also thankful to C.S.I.R., New Delhi, for financial assistance.

Botany Department,
University of Gorakhpur,
Gorakhpur 273 001 (U.P.),
India, *May* 26, 1977.

P. P. UPADHYAYA.

1. Ghosh, A. K., Bhargava, S. N. and Tandon, R. N., *Indian Phytopath.*, 1966, **19**, 262.
2. Moycho, W. and Niemyski, K., *Acta Agrobot.*, 1962, **12**, 261.
3. Diener, T. O., *Ann. Rev. Phytopath.*, 1963, **1**, 197.
4. Joshi, R. D., Dubey, L. N. and Gupta, A. K., *Sci. and Cult.*, 1977, **43**, 40.

A MUSCARDINE DISEASE OF TOBACCO LEAF-EATING CATERPILLAR

THE leaf-eating caterpillar *Spodoptera litura* on tobacco is an important pest in India. During our investigations on biological control of insect pests of agricultural crops utilizing fungi, a species of *Nomuraea* Maubl. (Hyphomycetes) was repeatedly isolated in pure culture from the caterpillars of *Spodoptera litura* at Poona during the rainy season of 1976. The fungus made slow growth on potato dextrose agar at 25°–28° C producing a colony 5 mm in diam. at the end of 10 days. Colonies were convex, shining, amorphous, initially white, later turning light-green with profuse sporulation.

Pathogenicity trials were conducted by spraying a dense aqueous spore suspension of the fungus on healthy caterpillars (7 days old). The fungus proved to be a virulent pathogen inflicting 100% mortality of the inoculated caterpillars after 4 to 6 days (Fig. 1). The fungus was reisolated from such infected caterpillars, satisfying the well-known Koch's postulates.

The fungus showed the following morphological characters :

Mycelium sub-hyaline, septate and highly branched. Conidiophores erect, septate, arising from the submerged hyphae, upto 240 μm in length, and 2·5–4 μm in width, bearing whorls of short branches originating just below the septum. These branches then gave rise to whorls of 2–3 phialides. Branches were short, cylindrical, measuring 5–7·8 × 2·1–3·5 μm, conidia dry, catenate, broadly ellipsoidal to cylindrical, smooth, pale green, phialidic, blastic, 2·5–4 × 1·8–2·6 μm (Fig. 2).

Based on detailed morphological characters, the fungus was identified as *Nomuraea rileyi* (Farlow) Samson[1]. This constitutes the first known report of this entomogenous fungus on *Spodoptera litura* from India[2].

FIG. 1. Caterpillars showing infection due to *Nomuraea rileyi* (Farlow) Samson.

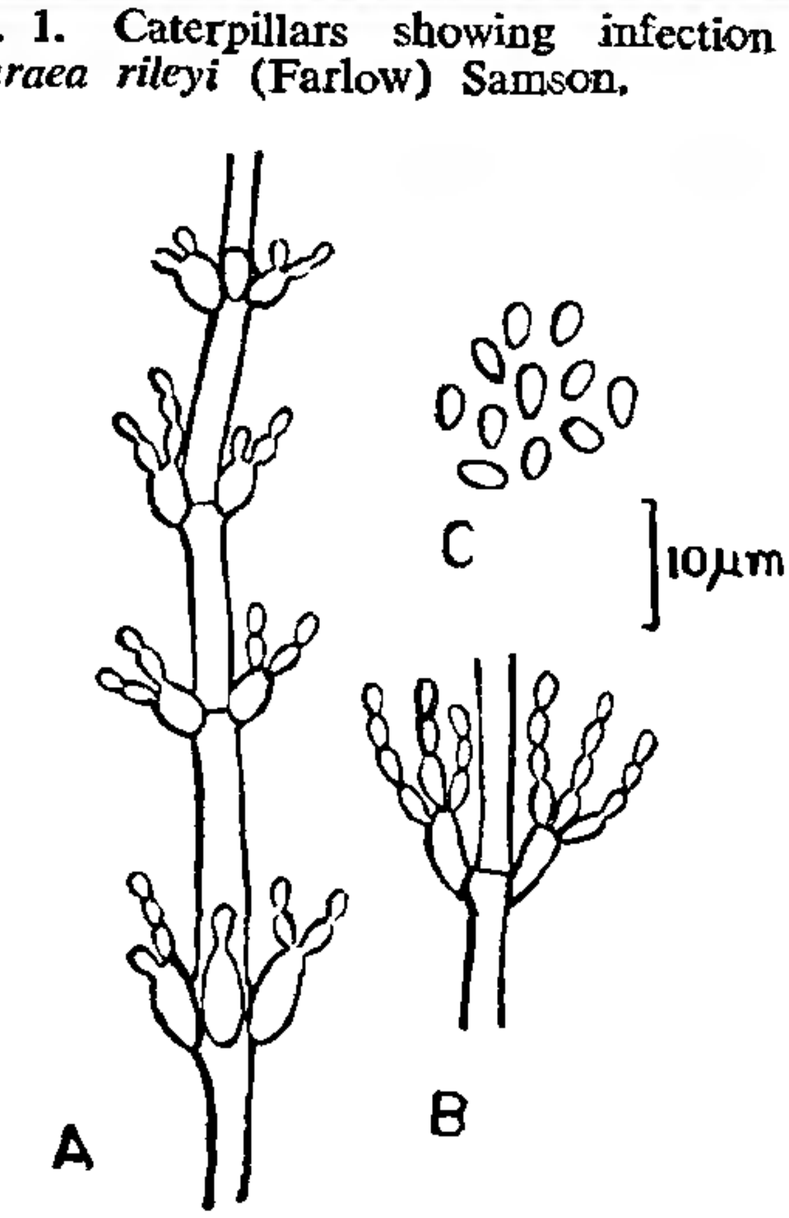

FIG. 2. Morphology of *Nomuraea rileyi* (Farlow) Samson. A, A fertile branch ; B, A part of conidiophore with short branches bearing phialides and catenate conidia ; C, Conidia.

The material has been deposited at M.A.C.S., Poona, under A.M.H. No. 3366 and also at C.M.I. Kew, England, under No. I.M.I. 210318.

The authors are grateful to Profs. M. N. Kamat and S. R. Bagal for their keen interest and

helpful suggestions, to the Director, for laboratory facilities, to Indian Council of Agricultural Research, New Delhi, for financial support, and to Dr. B. L. Brady, C.M.I., Kew, England, for kindly confirming the identification of the fungus.

Department of Mycology and Plant Pathology,
M.A.C.S. Research Institute,
Law College Road,
Poona 411 004, *June* 4, 1977.

V. G. Rao.
C. H. Phadke.

1. Kish, L. P., Samson, R. A. and Allen, G. E., *J. Invert. Path.*, 1974, 24, 154.
2. Mukerji, K. G. and Juneja, R. C., *Fungi of India* (1962–1972), Emkey Publ., Delhi, 1975, p. 224.

EFFECT OF ALAR, CCC AND ETHREL ON IAA-OXIDASE ACTIVITY OF LAMINA OF THE BANANA CV. MONTHAN

Control of plant growth in horticultural crops particularly in fruit trees has received the attention of research workers and fruit growers alike for several decades. One of the most recent developments is the use of Alar, CCC and Ethrel to control plant size. They regulate the physiology of treated plants. The effects of CCC and Alar on plants are opposite to those of gibberellin[1–3]. But Stuart and Cathey[4] felt that growth retardants should not be called as anti-gibberellins. Many workers have reported that the level of auxin was lowered following treatment with growth retardants ' Kuraishi and Muir[5] and Knypl[6] found that CCC retarded or inhibited auxin mediated growth mechanism. They also concluded that these compounds do not interact directly with gibberellin but with auxin. Thus the terminology has caused controversy. In the auxin studies the possibility of ethylene interference had been recognised when Van der Laan[7] demonstrated that exposure to ethylene would suppress the amounts of diffusible auxin, presumably by an increase in the activity of IAA-oxidase[8]. Auxin effects are often opposite to those of ethylene[9]. The relevance of these findings in plants is not clear. With this in view experiments were conducted to study the effect of Alar, CCC and Ethrel on the IAA-oxidase activity of the lamina of the banana CV. Monthan.

The tall growing culinary bana CV. Monthan was selected for the study. When the plants were two months old, foliar sprays of Ethrel (2, Chloroethyl phosphonic acid) at 250 and 500 ppm, CCC (2-chloroethyl trimethyl ammonium chloride) at 1000 and 2000 ppm and Alar-85 (Succinic acid-2, 2-dimethyl hydrazide) at 250 and 500 ppm were given till run off. After spraying, leaf samples (third leaf from the apex as per Hewitt[10] and Murray[11]) were drawn at 3-day intervals. The middle lamina portion of the third leaf from the apex were chosen for analysis. The colorimetric method[12] was adopted to estimate the IAA-oxidase activity. The oxidation of IAA was measured in Spectronic-20 at 540 mμ. Optical densities were converted to μg of IAA, employing a standard curve. Activity was expressed as μg IAA destroyed per gram of fresh tissue in two hours.

It could be seen from Table I that Ethrel 250 ppm increased the IAA-oxidase activity, except on the 3rd day. On the 9th day after spray, a maximum of 38·32% activity was recorded at 500 ppm of Ethrel. The increased activity of IAA-Oxidase would have thus caused decrease in auxin level leading to reduced vegetative growth of banana[13]. This lends support to the reports of Abeles[9] and Burg and Burg[14] that ethylene causes decrease in the auxin level.

Table I

Effect of growth regulators on IAA-Oxidase activity of Lamina of the CV. Monthan Banana (μg IAA Destroyed/G fresh tissue/2 hours)

Treatments	ppm	Days after spraying				
		3	6	9	12	15
Ethrel	250	529	654	738	679	797
	500	582	642	888	685	817
CCC	1000	608	667	413	334	771
	2000	638	608	396	433	796
Alar	250	417	708	429	675	750
	500	567	650	679	629	792
Control		563	617	642	658	717

Alar at 500 ppm also showed increase in IAA-oxidase activity except on the 12th day after spray and at 250 ppm it increased the activity from 6 to 15th day. Thus Alar also should have suppressed the endogenous auxin level, supporting the views of Halevy[15] and Kuraishi and Muir[6]. CCC caused increased IAA-oxidase activity initially, decreased activity during the intermediary stages and finally on 15th day, it again increased the activity. In banana, Annadorai[16] reported slight increase in growth due to CCC sprays. So it is presumed that CCC may likely to interfere in the synthetic pathway of gibberellin, late in the sequence. Such a change would stimulate the growth by CCC, due to switching of the biosynthetic pathway