ETHER ACETIC AS A FUMIGANT

During the last twenty years much attention has been paid to the use of the fumigants for the control of insect-pests of the stored products. Some of these fumigants have proved to be very promising. But in India little work has been done to study the use of fumigants. After a series of trials it was found that among the fumigants tried, "ether acetic" was a promising fumigant. The results of my small-scale experiments are presented here so that the interested workers may try it on large scale and confirm my view of its use on a commercial basis.

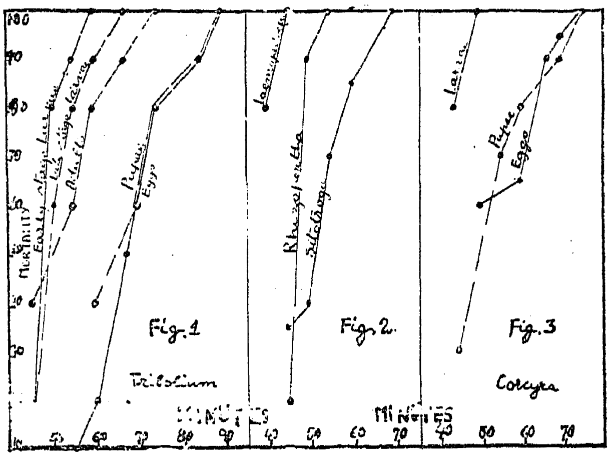
'Ether acetic' has not been used so far as a fumigant. It contains less than 80 per cent. pure ethyl acetate, and about 18 per cent. ethyl ether. Neifert *et al.*,[1] and Back and Cotton[2] have experimented with ethyl acetate, either as such, or in a mixture form with carbon tetrachloride but the ether acetic of commerce has not been experimented upon. Ether acetic is a colourless, clear, watery fluid, with a characteristic pungent smell. It is acid to litmus, miscible in all proportion with alcohol, chloroform, oil and ether. It is soluble in water, being more soluble at lower temperatures than at high temperatures. It is non-poisonous to human beings, and does not stain metal, wood or textile fabrics.

The experiments with ether acetic have been carried out on a laboratory scale. The experimental insects were taken in a small petri-dish and covered with cotton-wool. The dish was buried in a tank (glass) of dried fruits. Near the top of the tank was hung, from its lid, a flat dish containing ether acetic. No special precautions were taken to make the lid air-tight. For every observation a separate set was taken. In those cases in which the mortality was below 100 per cent. the experiments were not repeated. When the mortalities reached 100 per cent., the experiments were repeated at least six times, with different varieties of fruits. A record of temperature and humidity of the atmosphere was retained throughout the period of experiments. The following insects were used in the experiments: *Tribolium castaneum* Hbst (eggs, early larvæ, late larvæ, pupæ and adults), *Rhizopertha domenica* Fab. (adults) *Lœmophlœus* (adults), *Sitotroga cerealella* Oliv. (early larvæ), and *Corcyra cephalonica* Staint. (eggs, larvæ and pupæ). Adequate controls were run side by side. The dose of the fumigant remained constant, while the period of exposure was varied. The dried fruits used for the experiments were raisins dates, figs, walnuts and cashew-nuts.

Tribolium.—All the eggs were killed within 90 minutes' exposure. The early stage larvæ were killed in much shorter period, *viz.*, 100 per cent. mortalities in 60 minutes. The late stage larvæ appear to be more resistant than the early stage larvæ but less resistant than the eggs (100 per cent. mortality in 67 minutes). The pupæ are more or less as resistant as the eggs (100 per cent. mortality in 90 minutes). The adults are less resistant in comparison either to the eggs or to the pupæ, but more resistant than the larvæ (100 per cent. mortality in 75 minutes).

Rhizopertha adults succumb to the action of the fumigant within 55 minutes. The fumigant is equally effective against *Lœmophlœus* adults (100 per cent. mortality in 45 minutes), *Sitotroga larvæ* (100 per cent. mortality in 70 minutes), and *Corcyra* (the time taken for 100 per cent. mortality in the case of eggs 75 minutes, larvæ 50 minutes and pupæ 75 minutes).

The mortalities which take place after an exposure for shorter periods than mentioned above are shown in the graph.



Ether acetic is an effective fumigant for controlling insect-pests of dried fruits. A dose of ½ oz. per 6 cubic feet of space is sufficient to achieve 100 per cent. mortality in case of *Tribolium castaneum, Rhizopertha domenica, Lœmophlœus, Sitotroga cerealella* and *Corcyra cephalonica*.

The work was carried out in the laboratory of the Imperial Entomologist, New Delhi.

Agricultural Research
Laboratories, Gwalior, R. Rakshpal,
October 15, 1945.

1. Neifert, Cook and others, *U.S.*, *Bull.*, 1925, 1313.
2. Back and Cotton, *J. Econ. Ent.*, 1924, **17**, 663.

STUDIES IN THE SYNTHESIS OF SOME SUBSTITUTED BENZENESULPHONAMIDES PART. IV—SYNTHESIS OF TWO NEW N[1]-SUBSTITUTED *p*-ACETAMINO-BENZENESULPHONAMIDES AND THE CORRESPONDING FREE *p*-AMINO COMPOUNDS

In connection with the preparation of the azo compounds of Part III,[1] a review of the final reduction products, namely, the corresponding aminobenzenesulphonamides, revealed that *p*-aminobenzenesulphon-, methyl and ethyl-anilides and the corresponding N[4]-acetyl derivatives have not been synthesised so far. Their synthesis was, therefore, undertaken.

The method employed consisted of the condensation of *p*-acetaminobenzenesulphochloride (1 mole.) with methyl- and ethyl-anilines (each 2 moles) respectively, in alcoholic solution. The acetamino compounds were isolated and subsequently hydrolysed by boiling with 10 per cent. aqueous hydrochloric acid to the free amino compounds in the usual manner.

The equivalents of the two amino compounds were determined by diazotisation in acid solution with a standard solution of sodium nitrite checked against a standard solution of pure sulphanilic acid.

Compound	Yield %	M.P. in °C.	Percentage of Nitrogen		Diazotisation Equivalent	
			Calcd.	Found	Calcd.	Found
$CH_3CONH.\ C_6H_4.\ SO_2N<^{CH_3}_{C_6H_5}$	70	153–54	9·20	9·11	..	..
$CH_3CO\ NH.\ C_6H_4.\ SO_2N<^{C_2H_5}_{C_6H_5}$	69	125–26	8·80	8·77	..	..
$H_2N.\ C_6H_4.\ SO_2N<^{CH_3}_{C_6H_5}$	79	140	10·69	10·63	262	264
$H_2N.\ C_6H_4.\ SO_2N<^{C_2H_5}_{C_6H_5}$	82	132–33	10·14	10·13	276	280

The analytical data are summarised above.

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1. *Curr. Sci.*, *loc. cit.*

STACKBURN DISEASE OF RICE IN BENGAL

IN June 1945, a small laboratory experiment was started with a view to determining the relative abundance of pathogenic fungi borne on paddy seed. Forty seeds, some normal in appearance and others discoloured, were sown in Roux tubes on cotton soaked in distilled water. The tubes were all plugged and sterilised before use. In all, 21 seeds failed to germinate. All these eventually became covered with mycelium. In some cases, this mycelium was white, and on examination was found to bear, singly, on the tips of conidiophores not readily distinguishable from the mycelium, almost hyaline spores, rather resembling in shape those of *Alternaria*, club-shaped, septate, with an extremely long, septate "tail", the cells of the spore proper being constricted at the septa, with the second or third cell from the base often considerably larger than the rest. The fungus will be referred to for the moment as the "white mould". The distribution of fungi amongst the 21 non-viable seeds was as follows:

Helminthosporium oryzæ Breda de Haan—6.
Curvularia lunata—4.
White mould fungus—7.
Common moulds—4.

Out of the 19 seedlings which germinated (and which, naturally, eventually sickened through unfavourable conditions for development in the test-tubes) ten bore minute black sclerotia on the coleoptile, first leaf and roots. Four of these seedlings were removed and placed in a moist chamber. All developed the mycelium of the white mould fungus, with typical caudate conidia. Pure cultures were obtained and readily formed both sclerotia and spores on potato dextrose agar.

Germination tests were carried out on seeds of six varieties of paddy in petri-dishes. Five hundred seeds of each variety were used. Table I indicates the number of cases of seedlings showing each of the three fungi.

TABLE I

Incidence of Helminthosporium oryzæ, Curvularia *and white mould in* 500 *seeds of each of six varieties of paddy.*

Variety	*H. oryzæ*	*C. lunata*	White mould
Latisail	31	45	42
Kumargorh	62	12	28
Asra	20	12	19
Patnai 23	42	5	12
Nigersail	12	25	45
Du Lar	29	15	12

The fungus bore an unmistakable resemblance to that figured by Tullis (1936) and tentatively identified as *Trichoconis caudata* (App. and Str.) Clements, the sclerotium-forming fungus which causes seedling blight and stackburn disease (Tisdale, 1922) of rice in the United States of America. This fungus was originally described as *Piricularia caudata* with the conidial measurements 9-12 × 36-45 μ and the filiform seta 35-45 μ long. The measurements of spores of our white mould, including the appendage, taken from infected material in a moist chamber was 12·6 × 146·2 (8·5-15·7 × 103·2-172·7) μ, the difference in length being due to the extreme length of the