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#### EFFECT OF GALL MIDGE ATTACK IN PADDY AT FLOWERING STAGE

AN unusual wide-spread symptom appeared in late booting and/or panicle formation stage of rice varieties grown at the Central Rice Research Institute Farm during October–November, 1978. The affected plants showed profuse tillering, drastic reduction in the internodal length resulting in stunted growth and clustering of leaf blades at the top giving the appearance of bunchy top (Plate I). Panda *et al.* (personal communication) have described the symptoms in detail and attributed it to unidentified pathogens or nematodes.

Samples of twenty affected plants (each of Jaya, Pankaj, CR. 1014, T(N) 1 and some varieties from the genetic stock) were examined by the authors. First instar maggots of the rice gall midge (*Orseolia oryzae* Wood Mason) were found harbouring in the growing tips in about 90% of the samples examined. Normally, gall midge infestation does not occur after the tillering period and the maggots do not prefer this stage or produce gall when the panicle initiation has already started (Hidaka<sup>1</sup>). However, some abnormal gall formation on reproductive shoot apices has been reported by Hidaka<sup>2</sup>. The wide-spread symptoms manifested in the late stage of the crop reported here appear to be the first report of such a large magnitude. The possible reason is the continuation of the activity of the gall midge in the late stage of the crop in view of the favourable monsoon situation in October allowing continued development of the pest at a time when the crop was not in a favourable stage for the development of the larvae. Thus, the maggots were unable to produce the usual gall and remained in moribund stage. The initial feeding by the maggots apparently resulted in stunting, etc.



PLATE 1. Profuse tillers at the inter-nodal portion showing stunting due to gall midge attack during flowering stage of paddy.

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#### COMPARATIVE STUDY OF INHIBITION OF ACETYLCHOLINESTERASE ACTIVITY IN THE FRESHWATER TELEOST *SAROTHERODON (TILAPIA) MOSSAMBICA* (PETERS) BY SEVIN (CARBAMATE) AND SUMITHION (ORGANOPHOSPHATE)

It is well known that the primary biochemical mode of action of organophosphate and carbamate pesticides is the inhibition of acetylcholinesterase (AChE) activity in animals. It is suggested that measurement of

TABLE I  
Effect of Sevin and Sumithion on AChE activity and Ach content of some tissues of *T. mossambica*

Tissue	AChE- $\mu$ moles of Ach hydrolysed/mg protein/hr				Ach- $\mu$ moles/gm wt. of tissue			
	Control	Sevin	% change	Sumithion* % change	Control	Sevin	% change	Sumithion* % change
Brain	78.66 $\pm$ 6.36	42.92 $\pm$ 5.12	-45.43	-74	27.58 $\pm$ 2.81	64.71 $\pm$ 3.15	+135	+223
Gill	43.22 $\pm$ 3.39	30.19 $\pm$ 4.31	-30.14	-44	13.8 $\pm$ 1.53	24.19 $\pm$ 2.16	+75.28	+103
Muscle	57.78 $\pm$ 3.80	37.59 $\pm$ 2.19	-35	-54.13	6.03 $\pm$ 3.95	11.47 $\pm$ 1.25	+90.21	+202
Liver	25.76 $\pm$ 1.80	18.43 $\pm$ 2.10	-28.45	-39	12.48 $\pm$ 2.54	21.49 $\pm$ 2.36	+72.19	+105
Intestine	29.89 $\pm$ 1.96	24.13 $\pm$ 1.16	-19.27	-40	17.11 $\pm$ 2.03	25.68 $\pm$ 3.25	+50.08	+82
Kidney	18.12 $\pm$ 1.17	15.10 $\pm$ 1.26	-17	-28.20	7.3 $\pm$ 1.73	10.19 $\pm$ 1.12	+40	+68.49

Values expressed are mean  $\pm$  S.D. of 6 individual observations.

Changes after pesticide treatment are statistically significant  $P < 0.001$ .

\* Taken from Koundinya and Ramamurthi<sup>3</sup> (1978).

'AChE' activity indicates the extent of pollution of aquatic environment by organophosphate chemicals<sup>1-2</sup>. The present report is a comparative study of inhibition of 'AChE' and accumulation of 'Ach' in different tissues of a freshwater teleost exposed to lethal ( $LC_{50}/48$  hrs) concentration of Sevin and Sumithion.

Maintenance, size and weight range of fish used have been described earlier<sup>3</sup>.  $LC_{50}$  value as computed by probit method<sup>4</sup> was 10 mg/l for Sevin and 6 mg/l for Sumithion<sup>3</sup>. Commercial grade Sevin (carbaryl 1-Naphthyl N-methylcarbamate) which is extensively used in the local agricultural operations was used in the present study. AChE (Acetylcholine-acetylhydro-lase, E.C. 3.1-1.7) activity was estimated by Metcalf method<sup>5</sup> and Acetylcholine (Ach) content by the method of Yestrin as given by Augustinsson<sup>6</sup>. Protein content was estimated by Lowry *et al.*<sup>7</sup> Results from, an earlier paper on the effects of Sumithion were taken for comparison<sup>3</sup>.

The reduction of 'AChE' activity and accumulation of 'Ach' content in different tissues by Sevin and Sumithion were highly significant (Table I). Brain muscle and gill recorded maximal changes. Sumithion caused greater depression of AChE activity than Sevin. This could be due to the fact that carbamates are not metabolically activated *in vivo*, while the phosphorothionate insecticides are latent inhibitors and they are usually converted to active 'AChE' inhibitors by a microsomal (desulfurating) system in the presence of NAD or NADH<sup>8-9</sup>. The product formed (Sumixon) is a potent inhibitor of the enzyme. It is evident from the present work that organophosphate insecticides

are more toxic to fish than carbamates. Hence the use of such chemicals for plant protection needs extreme care in order to avoid deleterious effects to non-target species.

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