

An Integrated Programme for Controlling Pests and Diseases of Sesamum

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ABSTRACT

Field experiments were conducted during *khariff* and *rabi* seasons of 1974 and 1975 to evolve an integrated schedule of treatment against pests and diseases. Two rounds of foliar treatments were given at 40th and 60th days after sowing. In the *khariff* season, application of dithane M-45 0.2 per cent combined with endosulfan or fenthion 0.5 kg a.i./ha was effective in controlling powdery mildew, *Alternaria* blight, aphids and gallfly. In the *rabi* season when the incidence of powdery mildew was heavy, Miltox 0.25 per cent combined with either endosulfan or fenthion at 0.5 kg a.i./ha was best followed by dithane M-45 0.2 per cent combined with carbaryl 1 kg a.i./ha or endosulfan or fenthion 0.5 kg a.i./ha.

INTRODUCTION

Pests and diseases cause serious damage to gingelly (*Sesamum indicum* L.) resulting in substantial loss in yield. Among the various pests and diseases affecting the crop, the shoot webber and pod borer, *Antigastra catalaunalis* Dupon., the gallfly, *Asphondylia sesami* Felt., the aphid, *Aphis gossypii* Glover, the leaf blight, *Alternaria sesami* (Kawamura) Mohanty and Behera and the powdery mildew, *Oidium* sp., are important. Vittal and Saroja (1966), Muhamed *et al.* (1968) and Mathur *et al.* (1971) have recommended different insecticides like endrin, carbaryl, BHC and methyl parathion for the control of individual pests. Abraham (1975) has found endosulfan and fenthion each at 0.5 kg a.i./ha effective for the control of major pests. For

the control of *Alternaria* blight, Samuel *et al.* (1973) reported 1 per cent Bordeaux-mixture or 0.13 per cent dithane Z-78 to be effective. Natarajan *et al.* (1976) found that spraying either dithane Z-78 0.2 per cent or dithane M-45 0.15 per cent was efficacious in controlling blight. For the control of powdery mildew, Shanmugam *et al.* (1976) reported that sulphur dust or spray and Miltox to be effective in controlling the disease under conditions of heavy natural infection.

With a view to evolve an integrated schedule of treatment for controlling the major pests and diseases, field experiments were conducted during the *rabi* and *khariff* seasons of 1974 and 1975 and results obtained are presented in this paper.

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MATERIALS AND METHODS

Experiments were conducted in plots of 3.6 x 3.6 m size and 3.6 x 2.8 m in the *khariff* season (August to November) and 3.0 x 1.8 m in the *rabi* season (February to May) in randomised block design with three replications. During the *rabi* season of 1974, the insecticides endosulfan 0.5 kg a.i./ha and carbaryl 1 kg a.i./ha as also the fungicides, dithane M-45 0.2 per cent and Miltox 0.25 per cent were tried each alone or as insecticide-fungicide combination, all comprising of nine variants. The experiment was repeated with the same set of treatments in *khariff* 1974. The pesticides were applied on the 40th and 60th days after sowing. The effect of treatments in the control of the shoot webber was assessed by examining the entire plants and the number affected in each plot at the time of application of the second round of spraying. Capsule infestation by the same pest was gauged by recording the number of bored pods from out of the total number of pods on the central shoot of ten randomly selected plants a fortnight prior to harvest. For gallfly damage, the technique adopted for assessing capsule damage by *Antigastra* was adopted. In the case of aphids, the central shoot of each plant from out of 20 random plants in each plot was examined. The incidence of *Alternaria* blight was assessed as per the method described by Natarajan *et al.* (1976) and the disease reaction for powdery mildew was recorded following the method of Shanmugham *et al.* (1976).

During *rabi* and *khariff* 1975, the insecticide carbaryl was omitted and in its place, fenthion 0.5 kg a.i./ha was chosen as carbaryl was found to be ineffective against aphids, and fenthion had proved to be effective against this pest in separate trials conducted.

RESULTS AND DISCUSSION

During *Rabi* 1974, the insecticides alone and in combination with fungicides gave significant control of the damage by *Antigastra*. For the control of mildew, Miltox + endosulfan and Miltox + carbaryl were the most effective (Table I). The incidence of *Alternaria* blight was negligible and hence the efficacy could not be assessed during the season. The combination sprays were superior to other treatments in respect of yield. In *Khariff* 1974, aphids appeared in a severe form and the diseases, mildew and *Alternaria* were also prevalent. Endosulfan in combination with dithane or Miltox afforded significant protection from aphids, mildew and *Alternaria*. Due to severe damage by aphids, the crop withered early in Miltox, dithane and control plots rendering impossible to assess the incidence of *Alternaria* and mildew in these plots. Carbaryl was not effective for the control of aphids and large populations were evident in the plots treated with this chemical either alone or in combination. Dithane + endosulfan secured the highest yield closely followed by endosulfan alone.

In 1975 *rabi* season, the combinations of dithane M-45 or Miltox

TABLE I. Incidence of pests and diseases on Gingelly (1974).

Treatments	Rabi season 1974				Khariff season 1974			
	Mean% of attack by <i>Antigastra</i>		Disease index Powdery mildew	Yield kg/ha	Mean% of aphid free plants	Disease index		Yield kg/ha
	Plants	Capsules				Powdery mildew	Powdery mildew	
Dithane M-45 0.2%	10.8 (3.35)	2.5 (9.03)	35.6	947	1.2 (6.29)	—	—	152
Milttox 0.25%	7.6 (2.83)	2.8 (9.59)	26.3	1029	1.2 (6.29)	—	—	154
Endosulfan 0.5 kg a.i./ha	0 (0.71)	0.8 (5.08)	27.0	938	36.7 (37.03)	20.0	31.6	524
Carbaryl 1 kg a.i./ha	1.6 (1.38)	0.7 (4.91)	37.0	1040	1.2 (6.29)	9.0	44.3	326
Dithane M-45 0.2% + endosulfan 0.5 kg a.i./ha	2.1 (1.49)	0.6 (4.47)	31.3	1127	36.7 (37.12)	2.3	17.6	528
Dithane M-45 0.2% + carbaryl 1 kg a.i./ha	1.6 (1.25)	0.4 (3.61)	35.3	1136	1.2 (6.29)	7.3	17.0	130
Milttox 0.25% + endosulfan 1 kg a.i./ha	0.7 (1.02)	0.5 (3.86)	15.3	1118	28.3 (32.01)	1.6	21.3	431
Milttox 0.25% + carbaryl 1 kg a.i./ha	2.1 (1.49)	0.6 (4.56)	19.6	1147	1.2 (6.29)	6.0	18.6	162
Control	14.0 (3.86)	1.9 (7.80)	38.6	760	1.2 (6.29)	—	—	93
C. D. (P=0.05)	1.00	1.71	8.94	133	7.60			165

Figures in parentheses are transformed values.

— Plants dried up due to aphid attack.

with fenthion or endosulfan afforded significant protection against the shoot webber, *Alternaria* and mildew and at the same time, Milttox showed greater efficacy against mildew, but was on par with dithane M 45 (Table II). The yield differences however were not appreciable presumably due to heavy incidence of *Rhizoctonia* root rot in the experimental plots. During *khariff* 1975 season again, significantly better protection from shoot webber and gallfly was obtained with endosulfan or fenthion either alone or in combination with the fungicides. There was no significant difference between the treatments with regard to the control of *Alternaria* and mildew. During

this season, the incidence of *Antigastra* was higher than in the previous trials which may be due to late sowing in September. The yield was maximum with endosulfan + dithane M-45, but on par with the other combinations.

The overall conclusion derived from these trials is that combined application of endosulfan 0.5 kg a.i./ha or fenthion 0.5 kg a.i./ha with dithane M - 45 0.2 per cent or Milttox 0.25 per cent at the 40th and 60th days after sowing would ensure adequate control of the major pests and diseases. Wherever powdery mildew is heavy, Milttox may be used as it has been found to have better efficacy against

TABLE II. Incidence of pests and diseases (1975)

Treatments	Rabi season 1975			Mean Yield kg/ha	Khariff season 1975			Yield kg/ha	
	Mean% attack by <i>Antigastra</i> (plants)	Diseases index			Mean% attack	Disease index			
		Powdery mildew	<i>Alternaria</i>		by <i>Antigas- tra</i> (plants)	Gallfly (pods)	Powdery mildew	<i>Alternaria</i>	
Dithane M-45 0.2%	15.74 (23.39)	4.33	5.67	467	51.91 (46.12)	12.10 (3.467)	29.0	9.6	339
Milttox 0.25%	13.21 (20.90)	3.67	5.33	458	54.54 (47.64)	9.07 (2.991)	33.6	5.6	342
Endosulfan 0.5 kg a.i./ha	4.42 (11.82)	9.33	9.67	476	36.76 (37.28)	4.24 (2.020)	30.3	10.3	382
Fenthion 0.5 kg a.i./ha	2.54 (9.39)	10.00	11.33	417	39.05 (38.44)	6.00 (2.436)	30.3	18.3	347
Dithane M-45 0.2% + endosulfan 0.5 kg a.i./ha	1.22 (7.05)	7.33	5.33	482	40.53 (40.61)	5.22 (2.216)	21.6	8.0	509
Dithane M-45 0.7% + fenthion 0.5 kg a.i./ha	4.45 (12.13)	6.33	7.67	459	34.68 (36.11)	1.61 (1.129)	33.0	10.6	494
Milttox 0.25% + endo- sulfan 0.5 kg a.i./ha	1.96 (8.37)	5.00	4.67	478	38.55 (36.56)	5.21 (2.162)	32.3	14.0	464
Milttox 0.25% + fen- thion 0.5 kg a.i./ha	4.38 (11.71)	3.00	6.33	478	42.05 (38.49)	5.60 (2.306)	18.0	9.3	479
Control	14.77 (22.58)	17.67	13.00	404	65.77 (54.40)	13.96 (3.725)	39.3	14.6	293
C. D. (P=0.05)	5.54	4.95	2.91	NS	8.00	0.87	NS	NS	87.72

Figures in parentheses are transformed values.

N. S. - Not significant.

mildew. As for the economics of treatments, the yield obtained was uniformly high with endosulfan + dithane in all the seasons except in *rabi* 1975 when there was vitiation in yield due to root rot disease. The performance of carbaryl combined with the fungicides was poor during *khariff* 1974 when aphids appeared in pest form. There appears to be no report on the efficacy of integrated method of control in sesamum and the present investigation has indicated an efficacious and economic schedule of plant protection on this important crop.

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