days and 3 to 7 days killed the trophozoites at 3·12 and 6·25 μg/ml respectively. But flagyl when exposed to *P. aeruginosa* for 1 to 2, 3 to 4, 5 and 6 to 7 days, the concentrations of drug required to kill the trophozoites were 3·12, 6·35, 12·5 and 25·0 μg/ml respectively. When the drug was exposed to the mixture of these bacteria, for 1 to 2, 3, 4 to 7 days, 3·12, 6·25 and 50 μg/ml were required to kill the amoebae respectively. In the case of the control, the amoebicidal end point of flagyl was at 1·0 μg/ml and this activity remained constant for 1 to 7 days exposure to peptone water.

From the results, it can be concluded that all the five bacteria, tried to determine the inactivation of amoebicidal activity of metronidazole, were able to reduce more less, the amoebicidal action of the drug against *E. histolytica.*

Individually *P. aeruginosa* has the maximum reduction capacity among the five bacteria tried. The mixed bacterial population could reduce the amoebicidal activity of metronidazloe two times more than that of *P. aeruginosa* alone when the drug was exposed for 4 to 7 days in the bacterial cultures.

Metronidazole (flagyl) of May and Baker is a drug of choice against clinical amoebiasis. It is highly amoebicidal and kills trophozoites of *E. histolytica* at 1·0 μg/ml[3]. Failure of 'flagyl' in curing invasive and chronic amoebiases cases although are not many, still a few reports have appeared in scientific journals, (see introduction). Inactivation of amoebicidal property of flagyl by bacteria may be the reason. No experimental proof has been reported about the bacterial inactivation of metronidazole. The experimental results presented in this communication clearly reveals that bacteria can reduce the amoebicidal property of 'flagyl' although they may not completely inactivate the drug action against *E. histolytica*.

The authors wish to thank M/s. May & Baker, Lucknow Branch, for the supply of pure metronidazole.

Central Drug Research Institute, S. R. DAS.
Lucknow 226 001, SHEELA GHOSHAL.
September 13, 1978.

1. Candy, J. P., Ariz, F. H., *J. Am. Med. Assoc.* 1974, 230, 538.
2. Das, S. R., *Current Sci.*, 1975, 44, 463.
3. — and Prasad, B. N. K. *Ibid.*, 1973, 42, 796.
4. Dutt, D. V., Singh, S. A. K. and Chutrani. A. M., *Am. J. Trop Med. Hyg.*, 1974, 23, 586.
5. Griffin, F. M. *New Eng. J. Med.*, 1973, 238, 1397.
6. Mc Faedzean, *Indian Practioner*, 1969.
7. Pittman, F. E. and Pittman, J. C. *Am. J. Trop. Med. Hyg.*, 1974, 23, 146.

NOTE ON SECONDARY INFECTION OF DOWNY MILDEW IN PEARL MILLET

DOWNY MILDEW of pearl millet is a serious disease in India. Its severe infection had eliminated the cultivation of even the most widely adapted productive hybrids like H.B.-3 and H.B.-4. Even the most recently released resistant hybrids show susceptibility to a certain extent (7–10%) as reported in the IPMDMN (International Pearl Millet Downy Mildew Nursery Report[1] by ICRISAT.

The disease is presumed to be both soil as well as air borne. It is also believed to be partly carried by seed. The primary infection takes place from the soil by the oospores while the secondary or asexual infection occurs through air by the dispersal of sporangia.

In the present investigation nearly 1,672 lines of pearl millet, comprising, both segregating as well as non-segregating progenies, were evaluated for the intensity of secondary downy mildew infection. The progenies were sown in a sick plot. Susceptible plants were counted at two stages of plant growth : 1. *seedling (from 4–5 leaf stage to tillering)* and 2. Maturity (after heading to grain filling). Infector rows of old H.B.-3 were planted after each 10 lines to provide the spread of infection. First counting of *susceptible plants showing clear symptoms of infection, viz.,* yellowish broad streaks with whitish down from one end to another end of leaves of various length, was made from 4–5 leaf stage to tillering stage, in each row. *Second counting of infected plants* was made after heading to grain filling stage. The data are presented in Table I. The additional number of

TABLE I

Extent of primary and seconday infection of downy mildew (Sclerospora graminicola) *in pearl millet*

Genotypes	No. of lines observed	Number of susceptible lines		
		Primary infection	Secondary infection	Total infected lines
Inbreds	756	44	194	238
Segregating lines	577	36	81	117
Biparental progenies	144	30	27	57
Do.	78	27	37	64
Downy mildew resistant lines	76	19	19	38
White grained lines	41	2	8	10
Total	1,672	158	366	524
Per cent	—	9·4	21·8	31·2

susceptible plants obtained at maturity was due to sporangial infection. The results indicate that the primary infection (up to tillering stage) accounted only 9·4% suceptible lines out of 1,672. This infection increased to more than double accounting for 21·8% of total susceptible lines. This could be possible only by secondary infection due to sporangia. In order to check the spread of this disease it is advisable to rogue out the susceptible plants at first notice and deeply bury them away from the field. Singh, Thakur and William[2] also reported that sporangia play a major role in the epidemiology of pearl millet downy mildew.

Genetics Division, S. P. YADAV,
I.A.R.I.,
New Delhi 110 012,
March 29, 1978.

1. "International pearl millet downy mildew nursery (IPMDMN)," *ICRISAT Report*, 1976.
2. Singh, S. D., Thakur, R. P. and William, R.. "All India Coord. Millet Improv. Project, Annual Workshop, Bhubaneswar, Orri.a." *Ibid.*, April 7, 1977.

RESIDUES OF QUINALPHOS, PHOSALONE AND MALATHION IN/ON SORGHUM

AN attempt was made in this investigation to study the insecticides residues persisting in sorghum grain (CSH. 1) at the time of harvest following the application of phosalone 0·60 kg ai/ha (dust), 0·44 kg ai/ha (spray), quinalphos 0·50 kg ai/ha and malathion 1·00 kg ai/ha (spray) each time. The crop was raised during July–October 1977. The insecticides were applied at the above specified doses three times, *viz.*, 30th, 45th and 60th day after sowing. Composite grain and stalk samples were collected at the time of harvest and the insecticides residues were estimated. Quinalphos was estimated by the method of Getz and Watts[3]. The recovery of quinalphos in grain and stalk samples was 89·5 and 91·0% respectively. Phosalane was determined by the method of Anon.[2] and the recovery of this insecticide in fortified grain and stalk was 81·00 and 87·00% respectively. Malathion residues were estimated by the method of Weisenberg *et al.*,[4] and the recovery of malathion in both stalk and grain was 86·00%. The results are presented in Table I.

The results showed that in both the dust and spray applications phosalone residues were not detectable in grains but small amounts were found in stalks. Residues of quinalphos and malathion were detected both in the grain and stalk samples; the content being higher in stalk than the grain. In all the cases the residues were below the tolerance level fixed by the environmental protection agency (Anon.[1]).

TABLE I

Sl. No.	Chemical	Residues in ppm		Tolerance level in ppm (EPA, USA)
		Grain	stalk	
1.	Phosalone (Dust)	ND	0·45	2·00
2.	Phosalone (Spray)	ND	0·36	2·00
3.	Quinalphos (Spray)	0·32	0·85	2·00*
4.	Malathion (Spray)	1·21	1·66	3·00

* Tolerance limit of 2·00 ppm has been suggested by the manufacturer.

Pesticide Residue Lab., K. RAJUKKANNU.
Tamil Nadu Agricultural M. S. VENUGOPAL.
University, P. VASUDEVAN.
Coimbatore 641 003. M. BALASUBRAMANIAN.
May 6, 1978.

1. Anonymous, "Code of federal regulations", In: *Pesticide Chemicals*, Environmental Protection Agency, U.S.A., 1971, p. 49.
2. —, *Phosalone Determination*, Centre De Reachercher Nilchlas crillet (Rhone-poulence), Private communication, 1973.
3. Getz, E. and Watts, R., *J. Assoc. Offic. Anal. Chem.*, 1964, 47, 1094.
4. Weisenberg, Gertner, E. S. and Schoenberg, *J.*, *Analyst*. 1968, 93, 443.

PARTHENIUM HYSTEROPHORUS—A NEW HOST FOR *BREVIPALPUS PHOENICIS*

Perthenium hysterophorus Linn., a noxious exotic weed of family Asteraceae, has spread at Ujjain in diverse habitats including cultivated fields, with exclusion of other plant species probably due to its allelopathic interactions. It is not only harmful to crops and other plant species but also hazardous to the health of human beings as well as domestic animals[2, 4–6, 9, 10]. Several herbicides have been tried to check the growth of this weed[1]. Rajulu *et al.*,[8] have attempted to evolve a biological control of this weed by employing bugs of the species *Aphis fabae*.

In the present investigation a species *Brevipalpus phoenicis* (Geijskes), the false spider mite, belonging to class Arachnida, order Acarina and family Tenuipalpidae, which feeds on *Parthenium hysterophorus* has been reported. These mites are polyphagous and usually feed on the leaves of the hosts[7]. The large number of the alternate hosts have been recorded from our country[1]. *Brevipalpus phoenicis* is small, somewhat flattened, red and phytophagous mite. It has four palpal segments and two sensory rods on the tarsus II of the leg together with five dorsolateral