bodies. In the case of severe infection, a large number of spots cover the entire leaf surface.

Isolations from surface sterilized leaf spots on potato-dextrose-agar (PDA) medium yielded a species of *Phomopsis* Sacc.

The fungus grows as white colony on PDA, becoming pinkish with age. The hyphae are widely septate, irregularly branched and hyaline. Pycnidia are partly embedded in the substrate with a pinkish shiny appearance. They are subglobose to pyriform and sometimes irregular. Conidia single celled, hyaline, ellipsoid, measuring 4–7·5 × 1–3·5 μm.

Pathogenicity was proved by inoculating the spore suspension on leaves of healthy plants. Initial symptoms of the disease were observed within 4–5 days after inoculation.

Based on the cultural and morphological characters, the pathogen has been identified as *Phomopsis punicina* Trav. and the general characters agree with those described by Traverso[1]. This is the first record of *Phomopsis punicina* causing leaf spot of *Argyreia speciosa*. The specimen has been deposited in Herb. CMI, Kew, Surrey, England, under accession No. IMI 224123.

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TOLERANCE OF CERTAIN FUNGICIDES BY NITROGEN FIXING BLUE-GREEN ALGAE

NOWADAYS many pesticidal compounds are being used in the control of plant pathogens. Many of these chemicals reach the soil and persist for a long period causing harm to soil micro-organisms and consequently to plant growth[3]. Tolerance of such compounds by the beneficial microbes like nitrogen fixing blue-green algae is, therefore, very important for their survival in the soil. Very little information is available on the tolerance of blue-green algae to fungicides. The present paper reports the tolerance limits of these organisms to MBC (methyl carbomoyl benzimidazole), Difolatan [(N–(1, 1, 2, 2-tetrachloroethyl) sulfenyl cis-4-cyclohexane-1, 2-dicarboximide] and Hexacap (captan). Simultaneously, the effect of these compounds on seed germination of three rice varieties is also studied.

The organisms used in this study were *Westiellopsis prolifica*, *Aulosira fertilissima*, *Nostoc* sp., *Tolypothrix tenuis* and *Calothrix* sp. They were obtained from Division of Microbiology I.A.R.I., New Delhi and maintained on Fogg's nitrogen-free medium. The experiment was carried out in glass test-tubes containing 10 ml of the above nitrogen-free medium having 1, 5, 10, 50, 100, 300, 500 and 1,000 ppm concentrations (a.i.) of the fungicides. The exponential cultures of the algae were inoculated in tubes in triplicate. The tubes were incubated under fluorescent tubes at a light intensity of about 1,500 lux at 25 ± 3° C for eight hours. The cultures were allowed to grow for 30 days. The growth of the algae was measured (as O.D. of acetone soluble pigments) by standard method of Sorokin[2]. Effect of fungicides (at final tolerant concentrations) on seed germination of three (Suhasini, Surya and Satya) rice varieties was studied by using Petri dish moist chambers. The seeds were irrigated with 10 ml fungicidal suspensions and observed for percentage germination, root and shoot length after 7 days.

Table I indicates that *W. prolifica* did not tolerate MBC while *A. fertilissima* and *T. tenuis* could tolerate 1,000 ppm, and *Nostoc* sp. and *Calothrix* sp. 500 ppm. Comparatively *Calothrix* sp. was less affected in its growth than others. Variation in the tolerance by algal species was observed in the case of Difolatan. *Nostoc* sp. was more tolerant to this fungicide followed by *T. tenuis*, *A. fertilissima*, *W. prolifica and Calothrix* sp. in decreasing manner. Interestingly it was observed that *A. fertilissima* was increased in its growth by this fungicide. On the other hand *W. prolifica* and *T. tenuis* were more affected at the tolerant level. The stimulation of the growth of *A. fertilissima* by Difolatan may be attributed to the active metabolism and adoptation of this alga to this fungicide[4]. All algal species could tolerate 500 ppm Hexacap. The growth of *A. fertilissima* and *Calothrix* sp. was constant at their tolerant level while negligible growth reduction was seen in others. Venkataraman and Rajyalakshmi[5] reported the tolerance of high concentrations of Ceresan and Dithane-M by *T. tenuis*, *A. fertilissima* and *Anabaena* sp.

The results of the effects of fungicides (at the final tolerant level) on the germination, root and shoot length are given in Table II. MBC did not exert any adverse effect on the germination of all the three rice varieties at 500 ppm. But it reduced germination of these varieties by 5% except Satya at 1,000 ppm. Root and shoot length of Suhasini were more or less similar when compared with distilled water control. Thus fungicide reduced the root and shoot length about two folds in Satya and Surya. However, the shoot length of Satya was slightly increased at 1,000 ppm.

TABLE I

Tolerance limits of fungicides by nitrogen fixing blue-green algae

Alga	MBC		Difolatan		Hexacap	
	Final tolerant conc. (ppm)	% increase or decrease of growth	Final tolerant conc. (ppm)	% increase or decrease of growth	Final tolerant conc. (ppm)	% increase or decrease of growth
Westiellopsis prolifica	..	..	300	−65·0	500	− 6·6
Aulosira fertilissima	1000	−5·7	300	+ 5·7	500	00
Nostoc sp.	500	−7·9	1000	− 1·3	500	−14·0
Tolypothrix tenuis	1000	−3·2	500	−35·9	500	− 1·4
Calothrix sp.	500	−1·0	100	− 0·6	500	00

TABLE II

Effect of fungicides (at final tolerant level in ppm) on the germination of rice seeds

Rice variety	MBC		Difolatan		Hexacap	Control
	500	1000	500	1000	500	
1. Suhasini:						
% germination	100*	95	85	60	95	100
Root length (mm)	36	41	3	1	16	42
Shoot length (mm)	37	41	30	28	31	37
2. Surya:						
% germination	100	95	95	40	100	100
Root length (mm)	37	38	5	2	36	23
Shoot length (mm)	31	38	29	65	32	63
3. Satya:						
% germination	100	100	95	70	95	100
Root length (mm)	32	43	4	1	39	54
Shoot length (mm)	26	40	35	29	34	33

* Average of 100 seeds.

Difolatan exerted its adverse effect on the germination, root and shoot length of rice varieties. Roots were completely affected while the shoots were more or less unaffected by this fungicide.

Hexacap reduced seed germination by 5% *in Suhasini* and Satya while there was no effect on Surya. Similarly, root and shoot lengths were reduced in Suhasini and Satya but not in Surya. Reduction or stimulation of root and shoot growth by fungicidal action on plants is known[1].

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GAMMA RAYS AND MAGNETIC FIELDS—INDUCED VIVIPARY IN *CUCUMIS PUBESCENS* WILLD.

VIVIPARY is generally observed in Mangroves. But reports regarding vivipary in Monocotyledons have been made by B. M. Reddy[4] on *Pennisetum* and Kulkarni and Pandey[3] on *Livistona chinensis* and Foja Singh *et al.*[1] in *Allium cepa*. According to Reddy the suppression of vivipary is due to some inhibitor located either in the seed or associated structure and its expression is due to removal or deactivation of inhibitor.

Among Cucurbitaceae members, vivipary is generally confined to *Sechium edule* L. But induced vivipary was found to occur in *Cucumis melo* by R B. Katiyar[2]. The present communication deals with induced vivipary in *C. pubescens* after post-gamma and magnetic field treatment.

Dry seeds of *C. pubescens* were treated separately with 0·5, 1·0, 1·5, 2·0, 2·5, 3·0, 5·0, 10, 15 and 20 KR of gamma rays and magnetic fields of different strengths namely 1000, 2000, 3000 and 5000 Gauss respectively. The fruits were harvested after ripening. After 6 days of harvesting, one fruit after 2·0 KR treatment with gamma exhibited germinated seeds *in situ*. Out of 200 seeds in the fruit, 20 seeds had germinated. They were transferred into petridishes and were found to exhibit normal growth.

Similarly after 2000 Gauss magnetic field treatment, one plant exhibited vivipary in one fruit but the number of seeds germinated were less than those in the gamma ray treatment. This type of abnormality was not observed in the controls.

According to Kulkarni and Pandey[3], high humidity is the cause of vivipary in *Livistona chinensis*. Reddy and Chatterjee[4] found that vivipary in *Pennisetum* may be due to favourable action of rains or high humidity, or may be under the control of interaction of genotype with the season. In the present case, however, expression of vivipary is not due to favour of rains or high humidity. But the present observation with regard to gamma treatment falls in line with that of Katiyar[2] who reported that gamma irradiation either induced genetic alterations to interact with the environmental conditions or inactivated the inhibitors or destroyed them, leading to the expression of vivipary.

Induction of vivipary due to magnetisation may be having a similar basis. According to Reddy and Bhaskar Rao *et al.*[5] when the seeds are exposed to magnetic fields the magnetic energy far exceeds the chemical bond energy between the atoms, inside the atom and can induce chemical reaction or disrupt the structure of biological systems. The work of Dunlop and Schmidt[6] on *Pithophora* and Allium indicates that the magnetic fields can also alter the normal course of development.

This alteration of the normal course of development induced by magnetisation in the case of *C. Pubescens*, may have resulted in vivipary.

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