TABLE I

Fungal species from the rhizosphere and control soil of Parthenium hysterophorus

Fungal species	Pre-flowering stage	Post-flowering stage	Control
Alternaria tenuis	−	+	−
Aspergillus flavus	+	+	+
A. niger	+	+	+
A. ochreous	+	+	+
A. sulphureus	+	+	−
A. candidus	+	+	+
A. nidulans	+	+	−
Acremonium vitis	−	+	−
Acrostalagmus sp.	−	+	−
Circinella simplex	−	+	−
Cladosporium herbarum	+	+	+
Cunninghamella echinulata	+	−	−
Curvularia lunata	+	+	−
Fusarium sp.	+	+	+
Helminthosporium tetramera	−	+	−
Mucor racemosus	+	+	+
Mortierella sp.	−	+	−
Myrothecium roridum	−	+	−
Penicillium sp.	−	−	+
Phoma glomerata	−	+	−
Pythium intermedium	−	+	−
Rhizopus nigricans	+	+	+
Starkeomyces Koorchala moides	−	+	−
Theilavia terricola	−	+	−
Trichoderma viridis	−	+	−
Verticillium alboatrum	−	+	−
Paecilomyces sp.	+	+	−

TABLE II

Fungal species on the rhizoplane of Parthenium hysterophorus

Fungal species	Pre-flowering root bits	Post-flowering root-bits
Aspergillus niger	+	+
Cladosporium herbarum	+	+
Curvularia sp.	−	+
Fusarium sp.	−	+
Neocosmopara vasinfectum	−	+
Pyrenochaeta sp.	−	+
Rhizopus nigricans	+	−

but species of *Aspergillus* and *Cladosporium* could be isolated from all the platings. This clearly indicates that the root exudates can influence the composition of the root microflora[7]. Further work is in progress.

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SIGNIFICANCE OF NITRATE REDUCTASE ACTIVITY IN DEVELOPING COTTON SEEDS

NITRATE reductase (NR) is the key regulator of influx[1] of reduced nitrogen, since it is the first enzyme involved in the biosynthesis of amino-acids. The activity of nitrate reductase is mainly associated with the photosynthetic[2] cells. However, light can regulate its activity in the organ[3], situated at a distance from the green tissues *via* the supply of sugars, energy and reducing factors. There occurs a sudden upsurge[4] in the levels of soluble nitrogen and proteins in the immature cotton seeds, just after fertilization. It is obscure[5] whether the activity of nitrate reductase in the developing seeds supports the synthesis of amino acids and proteins in the seeds.

Gossypium arboreum L. var. G 27, *G. hirsutum* L. var. J 34, J 205, LSS, H 297, RS 1, RS 8, RS 11 and RS 89 were grown in the field in the *Kharif* 1974, following all the package of practices recommended by Punjab Agricultural University. Ovules were sampled from selfed flowers at pre-fertilization, fertilization and post-fertilization stages for the determination[6] of the nitrate reductase activity.

Unfertilized ovules from all the varieties showed nitrate reductase activity. There was observed a fertilization-induced increase in the enzymic activity, regardless of the variety. Maximum activity was obtained in the one-day old fertilized ovules. A gradual decrease in the activity, thereafter, continued until 32-day old seeds. It appeared that there was no significant genotypic

variation, rather it was the developmental stage of the seed which made the difference in the NR activity in the seed. Thus, a common type of change in ten varieties is being used here to generalize the process in cotton as whole (Fig. 1).

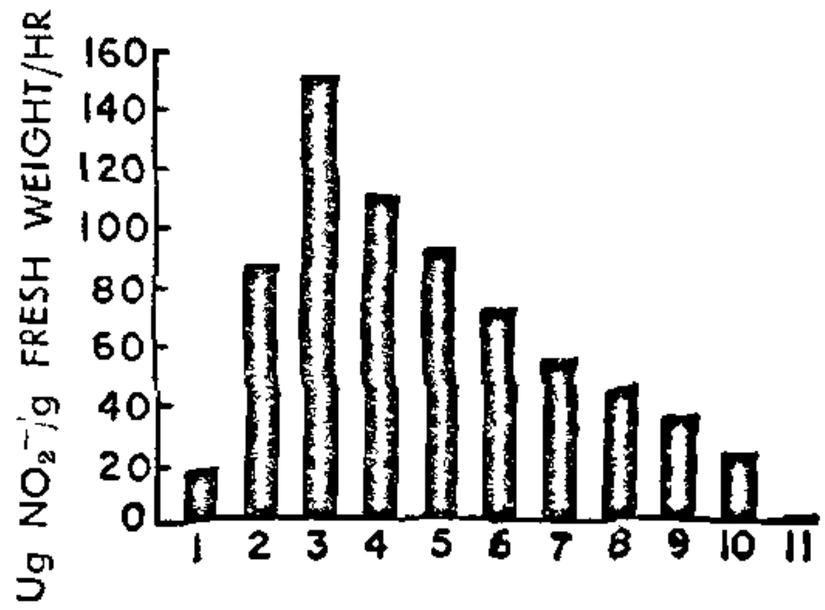

FIG. 1. Nitrate reductase activity in developing Cotton Ovules/Seeds. 1—Anthesis ; 2—Fertilization ; 3—One-day after fertilization ; 4—Four-day after fertilization ; 5—Eight-day after fertilization - - - - - - - ; 11—Thirty-two-day after fertilization.

Nitrate reductase is mainly a substrate[1] (No_3^-) inducible enzyme. However, plant growth regulators[7] also mediate the enzymic activity. In the case of cotton, fertilizations proceeds the synthesis[8] of auxins, gibberellins and cytokinins, which support the development of seed as well as cellulose fibre. During the early phase of seed development, protein synthesis is intense and nitrogen to be utilized in protein formation in the seeds is unlikely to be transported as nitrate ions, but in the form of organic nitrogen as amides and amino-acids (Woodruff[9], 1972). However, a positive relationship between enzymic activity and seed weight suggests that nitrate reductase activity in the seed is, somehow, associated with the seed development in cotton.

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FUNGITOXICITY OF SOME UREA DERIVATIVES OF 1, 3, 4-THIADIAZOLE

RECENTLY some mercapto and acetoxy derivatives of 1, 3, 4-thiadiazole have been reported to possess strong antifungal activity[1,2]. This prompted the authors to undertake the investigation of urea derivatives of 1, 3, 4-thiadiazole for their fungi toxicity and to evaluate their efficacy against standard fungicides.

The fungi toxicity of the compounds and commercial fungicides was observed against *Pythium aphanidermatum* by the poisoned food technique[3]. Requisite quantities of all the compounds were dissolved in a solution of acetone and water (5 : 95) so as to give a concentration of 5,000, 10,000, 20,000, 30,000 and 40,000 μg/ml. The same concentrations were maintained for the commercial fungicides in sterilized double distilled water. One ml of the prepared solution was added to presterilized petriplates containing nine ml of sterilized Czapek's agar medium so as to make a final dose of 500, 1,000, 2,000, 3,000 and 4,000 μg/ml of the compounds or fungicides in the medium. For control nine ml of the medium was supplemented with one ml of acetone : water (5 : 95) solution. A mycelial disc of 5 mm in diameter from the periphery of a 7-day old culture of the test fungus was inoculated upside downwards to assay plates. The plates were incubated at 28° C (± 1) and observations were recorded on the seventh day. The colony diameter of the test fungus was measured in mutually perpendicular directions and % mycelial inhibition calculated. Fungi toxicity of the compounds as well as of fungicides were measured in terms of toxicity index[4]. Experiments were repeated twice and each contained five replicates.

Out of seven urea derivatives of 1, 3, 4-thiadiazole, only two exhibited maximum toxicity index indicating their strong fungi toxicity at a minimum dose of 500 μg/ml (Table I). The toxic doses of both the compounds (4 and 5 in Table I) were four times less than that of commercial fungicides, *viz.*, Dithane Z–78 and Dithane M–45 while six times less than Ziram, indicating thereby that the compounds may be utilised as a new, more potent, fungi toxic agent on commercial basis. Table I also showed that the change in the position of nitrophenyl group of both the compounds (4 and 5 in Table I) had no effect on their fungi toxicity. Further studies to determine *In vivo* efficacy of both the compounds are in progress.