Council of Agricultural Research, New Delhi, for funds and the agricultural Institute, Kosbad Hill, for facilities.

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* Blue Belle is introduced from Texas, U.S.A.

** Kosbhat is a derivative of the cross (Mtu-3 × T.N. 1).

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INFLUENCE OF CARBON SOURCES ON IAA SYNTHESIS BY TWO SEED BORNE FUNGI

A WIDE variety of micro organisms are known to produce growth promoting substances under various conditions, such as pathogenesis, microbial interactions, mycorrhizal associations and rhizosphere[1–3]. Out of 112 fungal species *representing saprophytic* and parasitic, screened by Vyas and Jain[10] 61 species were found to produce growth promoting substances. A number of investigators[4–7] have reported the IAA synthesis, from tryptophan, a precursor of IAA. Sequeira[2] however pointed out that different organisms may have evolved different pathways of IAA synthesis involving precursors other than tryptophan. Hence a detailed investigation has been undertaken to study the IAA synthesis in the absence of tryptophan in different carbon sources by two seed borne fungi.

Monosporic cultures of *Phoma exigua* Desm. and *Graphium penicillioides* Corda *isolated from* seeds of *Phaseolus aureus* Roxb. and *Cyamopsis tetragonaloba* Taub, respectively were grown on 25 ml of Asthana and Hawker's liquid medium. Various carbon sources such as fructose, sorbose, sucrose, maltose, dextrin and starch were substituted for glucose of the basal medium. The sterilised flasks were inoculated and incubated at 25 ± 2° C. At the end of 4, 8 and 12 days of incubation, the mycelium was harvested and the culture filtrate was analysed quantitatively for IAA production by the method suggested by Bentley[9]. The uninoculated culture broth *plus reagent served* as control.

The results are presented in Table I. From the the table it is clear that *P. exigua* synthesised more IAA than *G. penicillioides* on all carbon sources. The efficiency of synthesis varied with the carbon source.

TABLE I

The IAA synthesis by P.. exigua *and* G. penicillioides *on different carbon sources at* 4, 8 *and* 12 *days of incubation*

Carbon Source	Days of incubation	IAA in µg/ml	
		P. exigua	*G. penicillioides*
Glucose	4	27·5	77·5
	8	573·0	257·5
	12	660·0	377·5
Fructose	4	20·5	..
	8	181·0	52·5
	12	252·5	137·5
Sorbose	4	..	..
	8	..	..
	12	..	..
Sucrose	4	7·5	..
	8	252·5	27·5
	12	410·5	202·5
Maltose	4	257·5	52·5
	8	407·5	132·5
	12	482·5	285·5
Dextrin	4	25·0	..
	8	102·5	74·5
	12	110·0	98·0
Starch	4	57·5	..
	8	87·5	89·5
	12	112·5	147·5

In general glucose favoured substantial IAA synthesis. Sorbose, a toxic monosaccharide for most of the fungi, did not allow IAA synthesis at any incubation period. The two oligosaccharides varied in their efficiency.

Maltose was superior to sucrose and favoured IAA synthesis from the 4th day of incubation, whereas in sucrose the synthesis reached to its maximum value on the 12th day. Dextrin and starch were almost equal in their efficiency to support IAA synthesis. *G. pentcillioides* could not synthesise IAA at the initial incubation periods, on fructose, surcrose, starch and dextrin. In all carbon sources the synthesising capacity was found to increase with the period of incubation. This may be due to secondary metabolic origin of the substance. Similarly Mahadevan[5] and Narania and Reddy[8] also reported the increasing trend of auxin concentration with the incubation period.

The authors are thankful to Prof. U. B. S. Swami, Head, Department of Botany, for providing facilities and one of the authors (MASC) is grateful to CSIR, New Delhi, for award of Junior Research Fellowship.

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AN APPROACH TO CONTROL BROWN SPOT OF RICE WITH CHEMICALS KNOWN AS PHYTOALEXIN INDUCERS

IT has been reported earlier from this laboratory that substantial resistance can be induced in rice plants to *Helminthosporium oryzae* Breda de Haan [conidial state of *Cochliobolus miyabeanus* (Ito and Kur.) Drechsler ex Dastur], the brown spot pathogen, by prior inoculation with a mildly virulent isolate or treatment with fluids containing its metabolites[1–3,8]. The occurrence of post-infectionally produced fungitoxic substance of phytoalexin type has been demonstrated for rice plants[1,4,5] and its involvement both in natural host defence[6] and induced host resistance[7,8] has been shown. In the background of such information it was felt that chemicals known to induce phytoalexin production in different plant species[9–13] might be useful in the control of brown spot disease. Results of exploratory studies in this direction are briefly presented here.

Susceptible rice plants (cv. Dharial) and a virulent isolate of *H. oryzae* were the experimental materials. Seventeen chemicals in the nature of heavy metal salts, amino acids, metabolic inhibitors and plant growth regulators, all known phytoalexin inducers[4,9–11], were tested in different experiments conducted as pot or field trials, mostly at dilute concentrations having little effect on spore germination. The pot and field trials were conducted under randomised block design with three replications per treatment. Plants were grown in 20 cm pots. Thirty seeds were sown in each. For field trials, each plot was of 1 sq. metre size. Inoculation of plants with spore suspension (*c.* 5×10^5 conidia/ml) and computation of disease index 4 days later were made following the methods of Sinha and Das[2].

In the initial experiment, all seventeen chemicals were used to spray 3-week-old seedlings in pots 2 days before inoculation. All of them, irrespective of their chemical nature, gave appreciable protection to the seedlings, most effective among them being DL-methionine, indole-3-acetic acid (IAA) and sodium malonate (Table I). Only copper sulphate and

TABLE I

Chemicals (phytoalexin inducers) used to spray rice plants, their more effective concentration, and influence on symptom production resulting from Helminthosporium *infection*

Test chemicals and their more effective conc.		No. of spots per plant*	Disease index per plant*
Water (control)		100·0	100·0
Nickel nitrate	(10^{-5} M)	35·1	31·7
Barium chloride	(10^{-3} M)	54·2	42·3
Ferric chloride	(10^{-4} M)	56·5	43·2
Cadmium chloride	(10^{-4} M)	50·6	49·8
Chromium chloride	(10^{-3} M)	86·1	55·0
Mercuric chloride	(10^{-5} M)	81·3	58·2
Silver nitrate	(10^{-4} M)	74·0	52·7
Copper sulphate	(10^{-5} M)	83·0	56·4
DL–methionine	(10^{-2} M)	37·3	20·3
DL–norleucine	(10^{-2} M)	64·3	34·0
DL–Norvaline	(10^{-2} M)	64·2	49·4
DL–valine	(10^{-2} M)	66·6	53·3
Sodium malonate	(10^{-4} M)	7·1	8·0
Sodium molybdate	(10^{-4} M)	77·4	41·6
Sodium iodoacetate	(10^{-4} M)	52·4	49·4
Sodium fluoride	(10^{-3} M)	72·4	65·9
Indole-3-acetic acid	(10^{-4} M)	27·2	21·7

* Mean of forty-five plants each treatment, fifteen from each pot, expressed as percentage of the control.