J Indian Bot Soc. 67 (1988) 186-187

Phosphate Solubilizing Activity of some Seed-borne Fungi of Maize

V. Krishna Reddy & S.M. Reddy
Department of Botany, Kakatiya University, Warangal-506 009

(Accepted September 1987)

Phosphate (P) solubilization capacity of seed-borne fungi of maize was investigated. *Aspergillus niger*, *Paecilomyces varioti* and *Penicillium* spp were efficient P-solubilizers, while *Alternaria alternata*, *Chaetomium globosum* and *Trichoderma viride* were poor. Species of *Curvularia*, *Drechslera* and *Fusarium* were weak solubilizers of phosporus from dicalcium phosphate. No correlation existed between liquifying activity of the fungus and pH change in the medium.

Key Words Fungi Liquefaction Phosphate Rhizosphere Solubilizing

Fungi are reported to play significant role in solubilization of phosphorus in soils (Tardieux, 1966; Rudhraksha, 1972). P-solubilization activity of fungi has been interpreted differently by different workers (Rose, 1957: Muromstev, 1958). Majumdar (1968) recorded great variation in P-solubilization among different strains of fungi isolated from rhizosphere and non-rhizosphere soils of sugarcane. Hence, the present study was aimed to assess the P-liquifying capacity of different seed-borne fungi of maize so as to enable to predict their possible role in growth.

MATERIALS & METHODS Seed-borne fungi (Table 1) were grown in 25 ml of medium (ammonium sulphate 0.5 g; glucose 10.0 g; sodium chloride 0.2 g; potassium chloride 0.2 g; magnesium sulphate 0.1 g; yeast extract 0.5 g; manganese and ferrous sulphates - traces and dist. water 1 L, pH 6.5) in 100 ml erlenmeyer flask at 27-29 C for 16 days. Adequate quantity of dicalcium phosphate equivalent (25 mg of P) was added to 25 ml liquid medium in the flasks. At the end of incubation period, cultures were harvested and pH of the culture filtrate was recorded in a pH meter. The amount of free P was measured (Durge & Palival 1967).

RESULTS & DISCUSSION *Aspergillus niger* was most efficient in liquifying P (Table 1) Species of *Penicillium* were next in their efficiency of P liberation. Similarly *Paecilomyces varioti* liberated considerable amount of P. *Chaetomium globosum* followed by *Trichothecium roseum* were poor in their efficiency of P-solubilization. *M. roridum*, *A. alternata* and *Circinella* sp. failed to liberate any P during the first 4 days but liberated significant quantity of P at later stage. Of the species of *Aspergilli*, *A. terreus* was a poor P-solubilizer while, *A.niger* was most efficient. Species of *Curvularia*, *Drechslera* and *Fusarium* were also poor in P-liquification. Surprisingly *T. viride* which is a soil inhabiting fungus was a poor P solubilizer. *Botryodiplodia theobromae* was also efficient P-solubilizer. pH of the medium drifted towards acidic side and final pH was about 5.0. The acidity was more (pH 3.3) in medium grown with *A. niger* and *P. oxalicum*. However, there is a lack of relationship between P-solublizing activity and pH changes. In contrast to present observations Taha *et al.* (1969) observed an inverse relationship between pH and P-liberation activity. We believe that the production of organic acid is not the sole mechanism of P-solubilization (Rudraksha 1972; Belsare 1983), or the phosphatase activity of the fungus involved in P-solubilization as believed by Neplekova (1967). Interaction of both the process may be responsible for P-solubilization. However, detailed investigations are needed to assay the phosphatase activity of fungi under well defined conditions.

ACKNOWLEDGEMENT Thanks are due to the Head, Department of Botany, Kakatiya University for providing facilities VKR is grateful to CSIR for financial assistance.

REFERENCES

BELSARE S W 1983 Studies into some Indian deuteromycetes with special reference to *Ampelomyces quisqualis* Ces. and phosphate solubulizing species Ph.D thesis, Poona University, Pune.

DURGE A S & K V PALIVAL 1967 Some aspects of ascorbic acid as a reductant in the estimation of phosphorus *Plant Soil* 27 461-464.

MAJUMDAR S B 1968 Studies of fungi in rhizoshere of sugarcane with special reference to their biochemical activities and the influence of root exudates Ph.d thesis Poona University, Pune.

Table 1 Solubilization of dicalcium Phosphate (μ/ml) by some Seed-Borne Fungi of Maize.

Fungus	Days of incubation			
	4	8	12	16
	Solubilized Phosphorus			
Alternaria alternata	-	30	30	120
Aspergillus flavus	40	129	298	169
A. niger	120	176	344	170
A. terreus	129	174	130	-
Botryodiplodia theobromae	43	174	302	85
Chaetomium cupreum	37	63	126	25
Circinella sp.	-	132	126	126
Chaetomium	21	18	-	-
Cladosporiium cladosporioides	37	40	40	99
Curvularia clavata	21	85	85	170
C. lunata	23	30	82	129
C. tuberculata	20	88	129	40
Drechslera rostrata	43	127	44	70
D. spicifera	82	83	129	42
Fusarium moniliforme	44	45	126	80
F. oxysporum	41	41	170	132
F. semitectum	38	-	-	-
Myrothecium roridum	-	20	25	120
Paecilomyces varioti	252	174	146	88
Penicillium funiculosum	171	210	128	86
P. islandicum	126	215	140	70
P. oxalicum	129	260	298	200
Phoma sorghina	39	44	130	170
Scytalidium state of Hendersonula toruloides	36	87	110	-
Stachybotrys atra	45	45	100	25
Trichoderma viride	82	82	90	132
Trichothecium roseum	41	41	42	86

RUDIIRAKSIIA G B 1972 The phosphorus solubulizing ability of soil fungi of different agclimatic zones of the Maharashtra State. Ph.D thesis, Poona University, Pune.

TAIIA S M, S A Z MAIMOND, A IIALIM EL-DAMATY & A M ABD-EL-IIAFEZ 1969 Activity of phosphate dissolving bacteria in Egyptian soils *Plant & Soil* 31 149-160.

TARADIEUX R A 1966 Contributions to the study of inter-actions between natural phosphates and soil microflora *Annls Agron* 17 403-471.

MUROMSTEV G S 1958 The dissolving action of some root and soil microorganisms on calcium phosphates, insoluble in water. *Agrobiologia* 5 9-14.

NEPLEKOVA N N 1967 Mobilization of difficulty assimilable phosphates by fungi and actinomycetes growing cellulase *Pochvovedeni* 11 74-81.

ROSE R E 1957 Technique for determining the effect of microorganisms on insoluble inorganic phosphates *N Z J Sci Tech* 38 773-780.