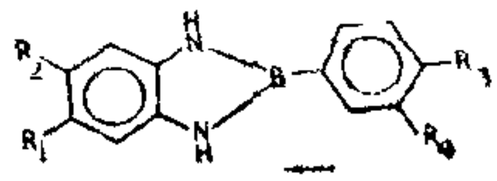
TABLE I

*Borimidazolines*



| Sl. No. | $R_1$ | $R_2$ | $R_3$ | $R_4$ | M.P.°C | Yield per cent | Properties | Formula | N% Found | N% Reqd. | B% Found | B% Reqd. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | $CH_3$ | H | H | H | 223–224 | 80·7 | light reddish brown flakes | $C_{13}H_{13}N_2B$ | 13·08 | 13·46 | 5·01 | 5·28 |
| 2. | $CH_3$ | H | $CH_3$ | H | 229–231 | 72·9 | light brown flakes | $C_{14}H_{15}N_2B$ | 12·54 | 12·61 | 4·83 | 4·95 |
| 3. | $CH_3$ | H | $OCH_3$ | H | > 293 | 67·6 | greyish brown powder | $C_{14}H_{15}N_2OB$ | 11·58 | 11·76 | 4·65 | 4·62 |
| 4. | $CH_3$ | H | Br | H | 217–218 | 65·5 | reddish brown plates | $C_{13}H_{12}N_2BBr$ | 9·93 | 9·76 | 3·80 | 3·83 |
| 5. | $CH_3$ | H | H | $NO_2$ | 276–277 | 59·6 | dark brown powder | $C_{13}H_{12}N_3BO_2$ | 16·83 | 16·60 | 4·52 | 4·35 |
| 6. | $CH_3$ | $CH_3$ | H | H | 242–243 | 77·4 | pinkish white shining plates | $C_{14}H_{15}N_2B$ | 12·78 | 12·61 | 4·83 | 4·95 |
| 7. | $CH_3$ | $CH_3$ | $CH_3$ | H | 257–258 | 80·1 | pinkish brown shining crystals | $C_{15}H_{17}N_2B$ | 12·01 | 11·86 | 4·39 | 4·66 |
| 8. | $CH_3$ | $CH_3$ | $OCH_3$ | H | 138–140 | 62·3 | dark brown crystals | $C_{15}H_{17}N_2OB$ | 11·04 | 11·11 | 4·18 | 4·37 |
| 9. | $CH_3$ | $CH_3$ | Br | H | 231–233 | 67·4 | light reddish brown shining crystals | $C_{14}H_{14}N_2BBr$ | 9·49 | 9·30 | 3·59 | 3·65 |
| 10. | $CH_3$ | $CH_3$ | H | $NO_2$ | > 290 | 66·6 | light brown flakes | $C_{14}H_{14}N_3BO_2$ | 15·64 | 15·73 | 4·23 | 4·12 |

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## BEHAVIOUR OF *MACROPHOMINA PHASEOLI* AND *SCLEROTIUM ROLFSII* WITH RELATION TO SOIL TEXTURE AND SOIL pH

THE importance of edaphic factors on the disease incidence in the case of soil-borne plant pathogens has been duly emphasised[1,4] and the effect of soil temperature, moisture and organic matter on the growth and multiplication of *Macrophomina phaseoli* (Maubl.) Ashby and *Sclerotium rolfsii* Sacc. in soils free from plant debris has been noted[3,5,6], but it is not known whether soil texture and pH have any influence on these fungi under similar condition. This communication therefore attempts to present some information regarding the effect of soil texture and soil pH on the prevalence of *M. phaseoli* and *S. rolfsii* in soils which do not contain any fragments of plant tissues.

Air-dried field soil was passed through a 80-mesh sieve to remove all the sand particles and the percentage of silt and clay content was deter-

mined by mechanical analysis[7]. Four different textural groups were artificially made with incorporation of sand, silt and clay, *i.e.*, light soil (sand : silt : clay = 55 : 30 : 15), medium soil (40 : 40 : 20), medium heavy soil (25 : 50 : 25) and heavy soil (10 : 60 : 30) and pH of the soil was adjusted to different levels, *viz.*, pH 5, 6, 7 and 8 following the methods as described by Chattopadhyay and Bhattacharjya[2]. Soils were inoculated separately with *M. phaseoli* and *S. rolfsii* isolated from jute and wheat plants respectively having sterilized them by autoclaving. Both the sets were incubated under controlled condition in darkness at 27° C and 50% saturation level. Observations were taken at regular intervals and data recorded after plating in peptone-dextrose agar. Results representing an average of three replications are presented in Tables I and II.

The growth behaviours of *M. phaseoli* and *S. rolfsii* have been observed to be different under various conditions of the soil. *M. phaseoli* showed a marked increase in population at medium soil texture (sandy loam) and more or less at all pH levels followed by gradual decline. Both pH 5 and 6 were found to be effective for the fungus; whereas at pH 8, there was a steady fall. *S. rolfsii* showed similar behaviour in all the treatments though there might have been slight rise in population at the intermediate stage in light and medium type soils as well as in soils having pH between 6–7, but its presence (mycelial form) in soil could not be detected after 20 days of inoculation.

Pycnospores, chlamydospores and sclerotia are reproductive structures of *M. phaseoli* whereas *S. rolfsii* perpetuates in the form of only sclerotia. Although both the fungi show certain

TABLE I

*Effect of soil texture on the prevalence of the pathogens*

| Count intervals (days) | Population ($\times 10^4$)/gm of soil on dry wt. basis | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | *M. phaseoli* | | | | *S. rolfsii* | | | |
| | Light soil | Medium soil | Medium heavy soil | Heavy soil | Light soil | Medium soil | Medium heavy soil | Heavy soil |
| 0 | 1·28 | 1·24 | 1·54 | 1·43 | 0·66 | 0·62 | 0·73 | 0·66 |
| 2 | 1·46 | 1·39 | 1·32 | 1·10 | 0·47 | 0·44 | 0·36 | 0·25 |
| 4 | 1·24 | 1·83 | 1·11 | 0·77 | 0·51 | 0·47 | 0·36 | 0·22 |
| 7 | 0·73 | 1·61 | 0·77 | 0·58 | 0·18 | 0·14 | 0·03 | 0·03 |
| 12 | 0·88 | 1·02 | 0·73 | 0·47 | 0·03 | 0·00 | 0·00 | 0·00 |
| 20 | 0·88 | 0·80 | 0·51 | 0·44 | 0·00 | 0·00 | 0·00 | 0·00 |
| Mean | 1·02 | 1·31 | 0·99 | 0·79 | 0·30 | 0·27 | 0·24 | 0·19 |
| | SEm ± 0·093 | CD at 5% | 0·2802 | | SEm ± 0·036 | CD at 5% | 0·1084 | |

TABLE II

*Effect of soil pH on the prevalence of the pathogens*

| Count intervals (days) | Population ($\times 10^4$)/gm of soil on dry wt. basis | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | *M. phaseoli* | | | | *S. rolfsii* | | | |
| | pH 5 | pH 6 | pH 7 | pH 8 | pH 5 | pH 6 | pH 7 | pH 8 |
| 0 | 1·46 | 1·39 | 1·50 | 1·54 | 0·77 | 0·69 | 0·73 | 0·73 |
| 2 | 1·32 | 1·61 | 1·57 | 1·39 | 0·55 | 0·58 | 0·51 | 0·44 |
| 4 | 1·65 | 1·54 | 1·06 | 1·17 | 0·47 | 0·66 | 0·51 | 0·33 |
| 7 | 0·95 | 0·95 | 1·02 | 0·99 | 0·29 | 0·40 | 0·33 | 0·18 |
| 12 | 0·84 | 0·88 | 0·73 | 0·51 | 0·03 | 0·14 | 0·07 | 0·11 |
| 20 | 0·80 | 0·88 | 0·66 | 0·44 | 0·00 | 0·00 | 0·00 | 0·00 |
| Mean | 1·17 | 1·20 | 1·09 | 1·00 | 0·35 | 0·41 | 0·35 | 0·29 |
| | SEm ± 0·063 | CD at 5% | 0·1898 | | SEm ± 0·0219 | CD at 5% | 0·0659 | |

similarity in the production of sclerotia but they differ in their mycelial characteristics. In *M. phaseoli*, the mycelium is coarse, dark coloured and thick walled; but in *S. rolfsii*, it is fine, hyaline and thin walled. The differential behaviours of these two fungi in response to soil pH and soil texture may be due to the differences in the morphology of the mycelium.

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## INHIBITORY EFFECT OF LIGHT ON THE PRODUCTION OF CITRIC ACID BY *ASPERGILLUS NIGER*

INFLUENCE of light of the visible range on growth, sporulation, etc., in microorganisms had been reported earlier[1-3]. Kamal *et al.*[4] had shown that light is necessary for good growth and formation of conidiophores, sterigmata, etc., in *Aspergillus niveus*. Little attention, however, was given on the effect of light on biosynthesis and accumulation of citric acid by fungal organisms.

*Materials and Methods*

The strain used for this study was *Aspergillus niger* 6N3 isolated from the soil of Naihati, West Bengal. Erlenmeyer flasks (100 ml) containing 25 ml of Shu and Johnson's medium (Shu and Johnson, 1948)[5] were inoculated with 0·1 ml of the conidial suspension ($10 \times 10^6$ conidia/ml) and incubated at 30° C under light, darkness and alternate light and dark conditions. Cultures under light condition were kept in an incubator fitted with fluorescent lamps for continuous illumination. The intensity of illumination falling on the cultures was measured with a lux meter and the value adjusted at 2,200 lux units equivalent to 205 candle power approximately. The dark condition was created inside a chamber covered with black cloth. Alternate light and dark conditions were given to two sets of flasks in the following way:

1. 12 hrs. darkness followed by 12 hrs. light (Dark-Light).
2. 12 hrs. light followed by 12 hrs. darkness (Light-Dark).

Control cultures were kept in an incubator at 30° C, and opened only for casual observation. Observations were made on the 9th day of incubation. Mycelial dry weight was taken on previously weighed filter papers by drying them at 60° C for 24 hours. Total acidity was estimated by titrating the culture filtrates against 0·1 N NaOH solution to the phenolphthalein end point. Citric acid content was estimated following the methods of Marrier and Boulet (1958)[6]. Different organic acids accumulated in the culture filtrates were extracted in ether and detected by the thin layer chromatographic methods[7].

*Results and Discussion*

Mycelial dry weight remained almost the same in the cultures grown under the different conditions. This clearly indicates that light or dark condition is not having any remarkable effect on the vegetative growth of mycelium. Even though the total acid production had not varied much under light or dark conditions when given separately, it showed a slight increase when light and dark conditions were given alternately. A profound decrease in the citric acid production had been noticed in those cultures grown under light condition, while dark condition slightly increased the citric acid production (Fig. 1). Cultures grown under illumination

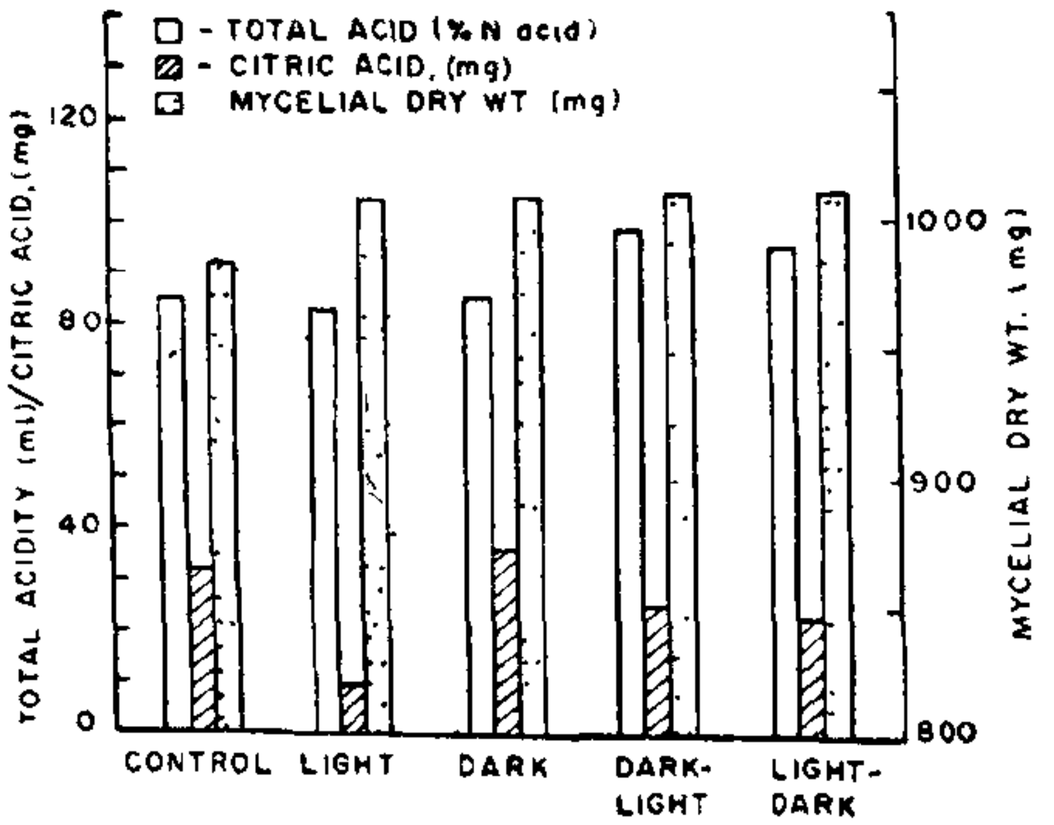


FIG. 1. Effect of light, dark and alternate light and dark conditions on mycelial growth and acid production of *A. niger* 6N3.