by regulating its metabolic processes. It is concluded that, by this regulative effect, the growth retardants cause the maintanance of a high level of proteins (Table II) in the shoots perhaps ultimately leading to higher percentage of flowering in the treated shoots (Table I).

TABLE I

*Extent of lowering as influencing by growth retardants*

| Year | Percentage of flowering shoots | | |
|---|---|---|---|
| | Control | Cycocel | Alar |
| 1972–73 | 24·75 | 64·75 | 46·75 |
| 1973–74 | 66·00 | 83·25 | 71·25 |

TABLE II

*Changes in proteins as influenced by growth retardants (Per cent on dry weight basis)*

| Month | Control | Cycocel | Alar |
|---|---|---|---|
| September 1973 | 4·85 | 5·12 | 5·12 |
| October 1973 | 4·81 | 4·96 | 4·92 |
| November 1973 | 3·99 | 4·67 | 4·57 |
| December 1973 | 4·02 | 4·44 | 4·25 |
| January 1974 | 4·07 | 4·23 | 4·12 |

| *S.E.* | | *C.D.* ($P = 0·05$) |
|---|---|---|
| (i) Treatments | 0·0121 | 0·034** |
| (ii) Months | 0·0210 | 0·060** |
| (iii) Treatments × months | 0·0514 | 0·149** |

TABLE III

*Proteolytic enzyme activity (in trytophan units) in leaf during* 1973–74 (*var. Mulgoa*)

| Month | Control | Cycocel | Alar |
|---|---|---|---|
| September 1973 | 0·75 | 0·65 | 0·62 |
| October 1973 | 0·93 | 0·75 | 0·72 |
| November 1973 | 1·04 | 0·88 | 0·81 |
| December 1973 | 1·60 | 1·37 | 1·25 |
| January 1974 | 1·82 | 1·54 | 1·44 |

| *S.E.* | | *C.D.* ($P = 0·05$) |
|---|---|---|
| (i) Treatments | 0·0031 | 0·010** |
| (ii) Months | 0·0041 | 0·012** |
| (iii) Treatment × months | 0·0071 | 0·021** |

The author is indebted to the Indian Council of Agricultural Research, for the award of Senior Research Fellowship, and to Dr. V. N. Madhava Rao, Dean, Faculty of Agriculture, Tamil Nadu Agricultural University, Coimbatore, for encouragement and guidance.

Tamil Nadu Agril. University,
Coimbatore 3 (India),
*September* 24, 1976.

V. SURYANARAYANA.**

* Part of thesis approved for the award of Ph.D. Degree by the Tamil Nadu Agricultural University, Coimbatore 3.

** Present address : Department of Horticulture, College of Agriculture, A.P. Agricultural University, Hyderabad-30.

1. Davies, N. C. and Smith, E. L., *Methods Biochem. Anal.*, 1955, 2, 215.
2. Maiti, S. C., Mukhopadyaya, A. K. and Sen, P. K., *Curr. Sci.*, 1971, 40, 388.
3. —, Basu, R. N. and Sen, P. K., *Acta Horticulturae*, 1972, 24, 192.

## PALYNOLOGICAL EVIDENCE ON THE AGE OF MIKIR FORMATION

NON-marine sediments of North Cachar Hills known as the Mikir Formation, unconformably overlie the denuded surface of the Archaean Complex. This formation is overlain by the marine Garampari Limestone. A rich palynological assemblage has been recovered for the first time from this stratal sequence. The assemblage mainly consists of pteridophytic spores with angiospermic pollen in subordinate amount and compares closely with the palynological assemblages of Tura and Cherra formations of Shillong Plateau. This favours a Palaeocene-Lower Eocene age for the Mikir Formation instead of a Cretaceous dating as proposed by the earlier workers.

The name Mikir Formation has been given by Samanta[12] (1971) to a group of sandstones, shales, argillaceous limestones and siltstones with strings of coal, developed in Garampani (25° 30′ 40″ : 92° 38′ 00″) area, North Cachar Hills, Assam. The formation rests unconformably over the Precambrian complex and is conformably overlain by Garampani Limestone. Medlicott[5] (1869), Latouche[4] (1883), Medlicott and Blanford[6] (1893) and Smith[13] (1893) all have designated the sedimentary strata perhaps belonging to this formation (Garampani Limestone in sense of Samanta, 1971), occurring below the nummulities in Mikir and North Cachar Hills as Cretaceous. Evans[2] (1932) for the first time expressed a doubt about their Cretaceous dating and favoured an Eocene age. Gangopadhyay[3] (1970) in connection with the Kopili Hydel Project mapped the area round Garampani. He designated the lower arenaceous facies as Cherra Stage and the

succeeding limestones and shales as Sylhet Limestone stage and Kopili Stage, respectively.

A large number of palynological rock samples were collected from Mikir Formation in field Seasons 1971–75 to determine its age and stratigraphical position in the light of palynological studies. Laboratory investigations have shown that the palynofossils recovered from this formation are dominated by the pteridophytes. Angiosperms are next in rumber. Algae and fungi are scantly represented. Stratigraphically significant taxa such as *Lycopodiumsporites palaeocenicus, Lygodiumsporites eocenicus, Cyathidites australis, Dandotiaspora telonata, D. dilata, Todisporites major, Polypodiaceaesporites tertiarus, Polypodiisporites oligocenicus, Proxapertites crassimurus, P. assamicus, Assamialetes emendatus, Palmidites plicatus, P. maximus, Nymphaeacidites sphericus* and *Polycolpites cooksonii* which form dominant assemblage in Cherra and Tura Formations of the Shillong Plateau, also abound in this formation.

Mikir-mioflora compares closely with that of Tura Formation of Garo Hills. *Assamialetes emendatus, Dandotiaspora telonata, Palmidites plicatus* and *Proxapertites assamicus* Cenozones instituted by Sah and Singh[10] (1974) in Tura Formation of Garo Hills are well distinguishable in Mikr Formation also. Thus the two formations seem to be synchronous. This contention is also supported by Samanta (1971, p. 325) after comparing his three foraminiferal zones of Garampani area with those of Garo Hills (Samanta,[11] 1968). Since Mikir Formation displays a close miofloral resemblance with Tura and Cherra formations of the Shillong Plateau it may also represent a Palaeocene-Lower Eocene age. Therefore, its cretaceous dating is ruled out. Predominance of continental fresh water elements and absence of any distinctive marine or brackish water form in the Mikir-mioflora further suggests the deposition of this lithounit, probably under freshwater condition.

Authors are grateful to the authorities of Birbal Sahni Institute of Palaeobotany, Lucknow, for providing facilities to carry out the present investigation.

Birbal Sahni Institute of Palaeobotany, Lucknow-226007, *September* 17, 1976.

R. Y. Singh.
N. C. Mehrotra.

1. Dutta, S. K. and Sah, S. C. D., *Palaeontographica*, 1970, **131 (B)** 1
2. Evans, P., *Trans Min. Geol. Inst. Ind.*, 1932, **27** 155.
3. Gangopadhyay, S., *Indian Jour. Power River Valley Devl. Spl. No.*, 1970, p. 32.
4. Latouche, *Rec. Geol. Surv. India*, 1883, **16** (4), 202.
5. Medlicott, H. B., *Mem. Geol. Surv. India*, 1869, **7**, 159.
6. — and Blanford, W. T., *Manual of Geology of India*, 1893, p. 301.
7. Sah, S. C. D. and Dutta, S. K., *Palaeobotanist*, 1966, **15** (1), 76.
8. — and —, *Ibid.*, 1968. **16** (2), 127.
9. — and —, *Ibid.*, 1974, **21** (1), 42.
10. — and Singh, R. Y., *Spl. Publ. B., Sahni Inst. Palaeobotan.*, 1974, **3**, 76.
11. Samanta, B. K., *Geol. Mag.*, 1968, **105** (2), 124.
12. —, *Jour. Geol. Soc. India*, 1971, **12** (4), 318.
13. Smith, F. H., *Mem. Geol. Surv. India*, 1898, **28** (1), 71.

## THE PRESENT SITUATION OF PHYSIOLOGIC RACES OF *PYRICULARIA ORYZAE* CAV. IN INDIA

Padmanabhan[1] reported the occurrence of physiologic races of *Pyricularia oryzae* Cav. for the first time from India. Padmanabhan *et al.*[2] reported the occurrence of thirty-one races of the pathogen after studying the pathogenicity patterns of one hundred and thirty-two isolates of *P. oryzae*, obtained through isolation from blast specimens collected from different States of India. One more race of the pathogen was reported to occur in India from Central Rice Research Institute[3]. Veeraraghavan and Premalatha Dath[4,5] have reported the occurrence of the physiologic races of the pathogen which could be detected by them during 1971–74. The present contribution relates to the identification of physiologic races of *P. oryzae* prevalent during 1975 in different parts of this country.

Sixty-five isolates of *P. oryzae* were obtained through isolation from blast specimens belonging to Kerala, Karnataka, Tamil Nadu, Andhra Pradesh, Orissa, West Bengal, Maripur, Himachal Pradesh, Haryana, Sikkim, Gujarat and Maharashtra. The method of raising the plants of the international blast differentials, inoculating and scoring them were essentially the same as described by Padmanabhan *et al.*[6]. Classification of host-reaction for identification of physiologic races of *P. oryzae* suggested by Veeraraghavan and Premalatha Dath[4] was followed. Under this method 'C' spots—circular spots about 2–3 mm in diameter with central ashy zone and dark purplish-brown margin—were considered as susceptible reaction of the host as also 'D' and 'E' type of spots both of which revealed central ashy zone, brown margin and sporulation. These features are common to 'C' type of spots also. The nomenclature and classification for physiologic races of *P. oryzae* presented by Veeraraghavan[7] was adopted.

The results of the analysis revealed that all the isolates of *P. oryzae* screened in this study belonged to the race 0-17 (IC 17 Ling and Ou). The pathogenicity pattern of this race of the pathogen is given in Table 1.