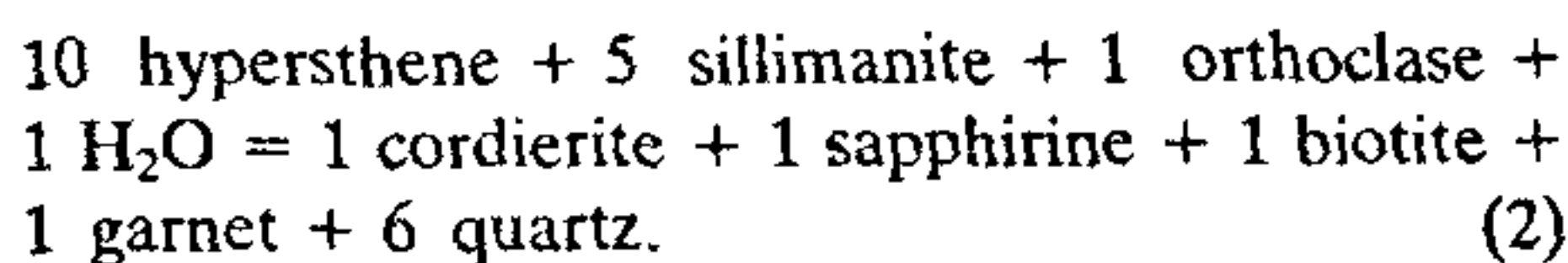
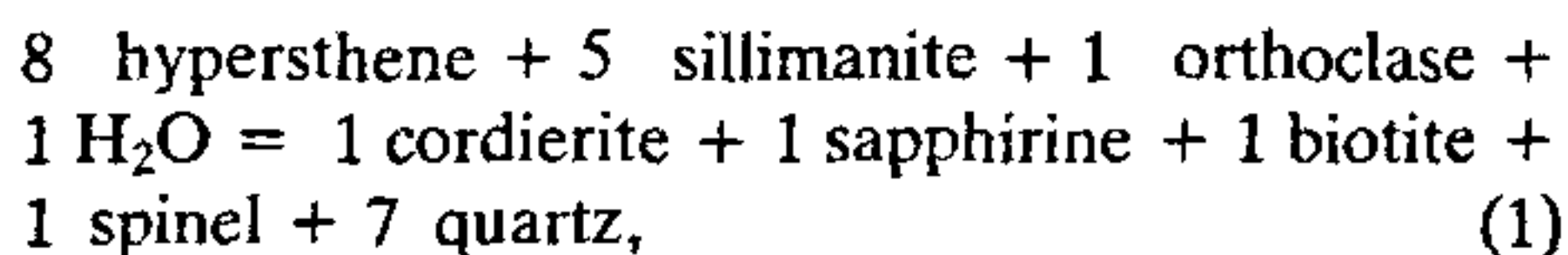


Table 1 Microprobe analyses* of sapphirine (1) and cordierite (4) in the biotite-hypersthene-sillimanite-gneisses of Kasipatnam, India, along with a comparison

	1	2	3	4	5
SiO ₂	12.59	13.71	13.33	48.65	48.36
TiO ₂	0.05	-	-	0.02	<0.01
Al ₂ O ₃	58.67	60.03	60.81	33.69	32.89
Cr ₂ O ₃	-	-	-	0.03	-
Fe as FeO	12.98	10.46	11.90	4.79	3.12
MnO	-	-	-	0.04	0.03
MgO	15.64	16.11	13.36	10.96	11.74
CaO	-	-	-	-	0.04
Na ₂ O	-	-	-	0.27	0.39
K ₂ O	-	-	-	0.02	0.05
ZnO	-	-	-	-	0.02
Total	99.92	100.31	99.40	98.47	96.64

* Electron-microprobe analyses (the data was carried out in Michigan State University, U.S.A. by A. T. Rao during UNESCO programme 1980-81); 2 and 3- Sapphirines from Paderu in the Eastern Ghats of India⁶; 5- Cordierite from Ellammankovilpatti in the Eastern Ghats of India³.

assemblages with various textural evidences in the Anakapalle and Paderu areas, in the immediate neighbourhood of Kasipatnam were realized to be not consistent with a simple interpretation³. However, the distinct nature of mineral assemblage viz. cordierite-sapphirine-spinel-garnet-biotite in close association with hypersthene-sillimanite and orthoclase is of great interest from the theoretical stand point of the following reacting and liberated products:



The reactions provide a useful geological information since similar assemblages are of reasonably widespread occurrence in the Eastern Ghats. The presence of significant amounts of biotite only in the sapphirine-cordierite-spinel-garnet assemblage indicates that a fluid phase is involved in the metamorphic reactions in addition to several mineral phases. The plumose symplectite nature of biotite (figure 2) in accordance with the sapphirine intergrowths suggests that these are secondary. The intergrown cordierite is often found to replace the K-feldspar-sillimanite-orthopyroxene assemblage leaving is-

lands of the high grade mineral phases. The textural features described above indicate that regional metamorphism is followed by retrograde metamorphism. The major deformational phases, during 3,000 m. y. and 2,600 m. y. in the Eastern Ghats^{4,5} are likely to have influenced such metamorphic events. According to Grew³, the metamorphic temperatures and pressures, in general, correspond to 800-850°C/6-10 kbar for the characteristic mineral assemblage: sillimanite-orthopyroxene-cordierite-garnet-sapphirine in the granulite belt of India.

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1. Middlemiss, C. S., *Geol. Surv. India Rec.*, 1904, **31**, 38.
2. Walker, T. L. and Collins, W. H., *Geol. Surv. India Rec.*, 1907, **36**, 1.
3. Grew, E. S., *J. Geol. Soc. India*, 1982, **23**, 469.
4. Halden, N. M., Bowes, D. R. and Dash, B., *Trans. R. Soc. Edinburgh Earth Sci.*, 1982, **31**, 38.
5. Rao, A. T., *Bull. Geol. Min. Met. Soc. India*, 1985, **53**, 159.
6. Higgins, J. B., Ribbe, P. H. and Herd, R. K., *Contrib. Mineral. Petrol.*, 1979, **68**, 349.

AN EARLY MATURING YELLOW SEEDED MUSTARD

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AN yellow seeded mustard (*Brassica juncea* (L.) Czern and Coss.) developed at this Research Centre flowered in 28.3 ± 1.5 days during the rabi season (mean of past three years). The total crop duration was 75 days compared to 93 days required for the cultivar Varuna, the national check. To the best of our knowledge this cultivar appears to be the earliest maturing strain among the 8390 mustard germplasm lines available in the country. Rapid-cycling populations of *B. juncea*, flowering in 19 days after sowing in glass house, under continuous illumination have been reported¹. The present culture was isolated from a segregating population of the cross between TM-4 × Lethbridge in the F₇ generation during 1984-85. It was found to be true breeding and was designated as TM-18. One of the parents, TM-4 having yellow seed coat colour was

Table 1 Important characters of Varuna and TM-18

Characters	Varuna	TM-18
Plant height (cm)	135.9 ± 4.97	109.9 ± 2.26
Days for first flowering	34.0 ± 1.00	28.3 ± 1.46
Days for harvest	93.3 ± 0.88	74.7 ± 1.20
Pod no. per plant	290.8 ± 19.60	261.9 ± 24.10
1000 seed weight (g)	3.30 ± 0.12	2.71 ± 0.16
Oil content (%)	29.42 ± 0.23	31.83 ± 0.08
Per plant yield of best five plants (g)	9.59 ± 1.62	7.97 ± 1.29
Plot yield per m ² (g)	125.00 ± 17.45	116.60 ± 13.48
Per day yield (kg/ha)	13.22 ± 1.43	15.64 ± 1.46

developed at this centre, while the other parent Lethbridge was a Canadian variety also with yellow seed coat. The effects of day length and temperature on the flowering of TM-18 and Varuna sown on the first day of every month were studied on plants grown in pots for one year. The number of days

required for first flowering in TM-18 ranged from 24–38 days compared to 33–56 days for Varuna. Thus throughout the year, TM-18 was earlier to Varuna. The important characteristics of TM-18 in comparison to Varuna are given in table 1 and the plant types are shown in figure. The main advantage of TM-18 is its earliness.

Early types, though lower in yield, are suitable for multiple cropping. At present toria (*B. campestris* var. *toria*) is being grown in the hill, the north-western and central zones of India. The toria cultivars require 84 days for maturity. Considering the advantages of yellow-seeded mustard over toria, the early maturing mustard can replace toria in these zones. In addition, early sown mustard escapes from pests and diseases^{2,3}. Early varieties usually escape frost and also have better opportunity under moisture stress to attain their full potential.

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1. Williams, P. H. and Hill, C. B., *Science*, 1986, 232, 1385.
2. Rai, B., *Proc. Natl. Symp.* 7–9 Nov. 1979, IARI, New Delhi, p. 131.
3. Singh, S. G. and Chauhan, Y. S., *Proc. Natl. Symp.* 7–9 Nov. 1979, IARI, New Delhi, p. 77.

A NEW SPECIES OF THE GENUS *CALAMUS* LINN. (ARECACEAE) FROM INDIA

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DURING a survey in the Kerala forests a new species of *Calamus* was collected which is described here.

Calamus vattayila Renuka sp. nov.

Rattanus alte scandens, caule vaginis tectis ad 2.5 cm diam., nudo ad 1.5 cm diam., internodiis ad 20 cm longis, vaginis atrovirentibus, sparse spinosis, spinis interdum acroscopicis, genu conspicuo, ocrea parva 0.5 cm long, foliolis atrovirentibus ad 40 cm longis 10 cm latis venis 6, inflorescentia 60 cm longa, bracteis omnibus arcte vaginantibus spinis armatis, floribus femineis ad 5 mm longis, fructibus ignotis. -Typus: Moozhiyar. Renuka 4001 (♀; holotypus MH).



Figure 1A, B. Plant type in Varuna and cultivar TM-18. A. Varuna, B. TM-18.