

Name of the variety	Amreli	Baroda	Jamnagar Giant	Akola 136	Akola 14D	Sathi	Jagudan	Bulk
Total marks	121	108	94	82	80	70	49	44

Standard error % of the mean, 9.8.

Significant difference between variety totals, 22.5.

Fisher and Yates<sup>1</sup> have given tables for converting such ranked data into normal scores for the purpose of statistical analysis. The data were therefore re-examined after transformation into normal scores but the resulting analysis of variance and the significance of the difference between varieties were very similar to those obtained by the analysis of the original data and confirmed the validity of the conclusions to be drawn.

The analysis of variance clearly shows that varietal differences were quite distinctly significant. The locally favoured varieties Amreli and Baroda occupy the first two places. It is remarkable that Jamnagar Giant, against which there is a considerable amount of prejudice, takes the third place and is thus classified along with the best varieties. Another interesting result is that the bulk which is a mixture of all the varieties in the trial occupies the lowest place. It is clear that due to its heterogenous composition its taste was not appreciated. The comparatively low standard error attained indicates that it is possible to perform experiments of this kind with a considerable degree of accuracy.

*Trial B.*—The varieties are arranged below according to their total scores:—

Name of the variety	Baroda	Jamnagar Giant	Akola 14D	Akola 136	Amreli	Jagudan	Sathi	Bulk
Total scores	71	70	59	45	35	28	25	18

Standard error % of the mean, 13.4.

Significant difference between variety totals, 16.6.

It will be seen that except for the change in the position of the Amreli variety the results of these two independent trials agree with each other very closely. An explanation of the discrepancy with regard to Amreli may be found in the fact that the majority of the persons taking part in trial A belong to the farming community in Gujerat who show a general preference for the Amreli variety, whereas the members of families in trial B have no reasons for such preference. There is little doubt that there is no ground for the prejudice against Jamnagar Giant as far as its taste is concerned.

The results have demonstrated that taste can be studied objectively by the application of modern statistical methods, that Jamnagar Giant variety of *bajra* was consistently classed among the best varieties and that the local prejudice against this variety was not well founded.

I am indebted to Mr. R. G. Allan, Commissioner of Agriculture, for his encouragement in undertaking this investigation, to Dr. V. G. Panse of the Institute of Plant Industry, Indore for his help in the statistical analysis of results and to the various persons who co-operated in the investigation.

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<sup>1</sup> Fisher, R. A., and Yates, F., *Statistical Tables for Biological, Agricultural and Medical Research*, Oliver and Boyd, London, 1938.

#### A QUICK AND SIMPLE PROCEDURE FOR THE ESTIMATION OF VITAMIN B<sub>1</sub> IN RICE

THE vitamin B<sub>1</sub> content of Co. 9 raw husked (wooden huller) rice was determined by the biological method according to the technique of Scheunert and Schieblich.<sup>1</sup> The rice contained 200 I.U. or 600  $\gamma$  per 100 grams. The results of the biological assay are given below

TABLE I

Groups	Daily dose of supplement per rat	No. of rats	Sufficient	Insufficient			
	Co. 9 raw husked rice gm.			Decrease of wt. $\Delta$ 2 gms.	Cramps	Cramps and died	Died
I	a 0.5	10	10	—	—	—	—
	b 0.25	10	9	1	—	—	—
	c 0.20	10	5	5	2	2	1
Synthetic Vitamin B <sub>1</sub> I.U.							
II	a 0.6	10	9	1	—	—	1
	b 0.5	10	9	1	—	1	—
	c 0.4	10	5	5	—	3	2

A sensitive Cohen's<sup>2</sup> type of photoelectric fluorometer which gave a deflection of 50 mm. per  $\gamma$  of vitamin B<sub>1</sub> and a blank of 10 mm.

TABLE II

No.	Strength of HCl	Kept overnight at	$\gamma$ Vitamin B <sub>1</sub> per 100 grams of Co. 9 husked rice (observed)	Computed value $\gamma$ Vitamin B <sub>1</sub> per 100 grams	Recovery %
1	0.1N	37° C.	267		
2	0.1N	Room Temp.	267		
3	0.5N	37° C.	298		
4	0.5N	Room Temp.	307		
5	1.0N	37° C.	304		
6	1.0N	Room Temp.	302		
7	0.5N	4 Hrs. shaking	298		
8	0.5N	2 Hrs. "	300		
9	0.5N	1 Hr. "	295	490	60
10	0.1N + Pepsin (Pyke <sup>3</sup> )	37° C.	372	510	73
11	0.1N + Pepsin (Pyke <sup>3</sup> ) + Taka diastase <sup>3</sup>	5 Hrs. at 37° C.	365	507	72

was constructed with a colour filter of methyl violet and copper chloride so that only the fluorescent energy of thiochrome was allowed to pass through and fall on the photoelectric cell.

The above procedure (Table II) for the extraction of vitamin B<sub>1</sub> from rice were tried.

It is evident from the above results that the maximum of vitamin B<sub>1</sub> is extracted in the minimum time according to procedure (9). The results according to the procedures 9, 10 and 11 do not show the presence of either combined vitamin B<sub>1</sub> or cocarboxylase in the rice under investigation. The vitamin B<sub>1</sub> of the Co. 9 raw husked rice was estimated according to the method of Hills<sup>4</sup> (where the blank value is eliminated) and found to contain 510  $\gamma$  per 100 grams of the rice which is in close agreement with the computed values according to procedures 9, 10 and 11 (Table II). A series of vitamin B<sub>1</sub> determinations in Co. 9 husked rice were made and the standard deviation and standard error were calculated. They were found to be 4.8 and 1.8 respectively.

In conclusion the following quick, simple and elegant method for the estimation (Thiochrome method) of vitamin B<sub>1</sub> in rice is recommended.

To two glass stoppered bottles 5 gm. of rice are weighed out and 50 c.c. of 0.5N HCl are added to each. To the second bottle a known quantity of standard vitamin B<sub>1</sub> solution is pipetted out (to estimate the per cent. recovery of added vitamin B<sub>1</sub>). Both the bottles are tightly stoppered and shaken for one hour on a shaking machine. Then the contents are centrifuged for 5 minutes. 3 c.c. of the centrifugate from each are used for the estimation of observed value and per cent. recovery of added vitamin B<sub>1</sub> respectively according to the original method of Jansen.<sup>5</sup> For 3 c.c. of the rice extract it is found that 1 c.c. of 1 per cent. potassium ferricyanide is the optimum quantity. Two different standard vitamin B<sub>1</sub> solutions are tested every time a reading is taken to determine the sensitivity of the fluorometer. The greater volume of the solutions when vitamin B<sub>1</sub> is added for recovery experiments is taken into account for calculations. The

vitamin B<sub>1</sub> content of the rice is calculated from the results of the observed value and per cent. recovery of added vitamin B<sub>1</sub>.

The vitamin B<sub>1</sub> content of a few varieties of rices by the above procedure are given below:

TABLE III

Rice	Colour	γ Vitamin B <sub>1</sub> per 100 gms. (observed)	γ Vitamin B <sub>1</sub> per 100 gms. (computed)	Recovery %
Co. 9 raw husked (wooden huller)	Red	300	500	60
Adt. 11 Do.	White	302	409	74
GEB 24 Do.	"	279	490	57
Co. 4 Do.	"	307	404	76

The details of this paper and further work on the vitamin B<sub>1</sub> content of other cereals and pulses according to our procedure will be published elsewhere.

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<sup>1</sup> Scheunert and Schieblich, *im Hdb. d. Lebensmittel-chemie* hrsg von Bömer, Jukensack u. Tillmans Bd. II/2, S. 1548.

<sup>2</sup> Cohen, *Rec. Trav. Chim.*, 1935, **54**, 133.

<sup>3</sup> Pyke, *J. Soc. Chem. Ind.* 1939, **58**, 338.

<sup>4</sup> Hills, G. M., *Biochem. J.*, 1939, **33**, 2, 1966.

<sup>5</sup> Jansen, *Rec. Trav. Chim.*, 1936, **55**, 1046.

#### A NOTE ON DR. KAJALE'S RECENT PAPER ON THE AMARANTHACEAE

RECENTLY Dr. L. B. Kajale<sup>1</sup> has published an exhaustive work on the Embryology of the *Amaranthaceae* in which he has made some very valuable additions to our knowledge of this family. On p. 610 of his paper he mentions having found one instance in *Cyathula tomentosa* in which the four megaspores of the tetrad were arranged in the form of an inverted "T".

Three other instances of a similar kind are quoted from previous literature:—*Zauschneria latifolia*,<sup>2</sup> *Angora pallida*<sup>3</sup> and *Ludwigia parviflora*.<sup>4</sup> Since the development of the embryo-sac in all these plants is of the *Cenothera*-type, Dr. Kajale goes on to add that in forms with a normal type of development such an arrangement of megaspores is unknown, his being the first recorded instance of the kind.

Dr. Kajale is right with regard to the rarity of this phenomenon in families other than the Onagraceae. Its more frequent occurrence in the latter is obviously related to the fact that here the micropylar megaspore usually functions in preference to the chalazal and hence any irregularity with regard to the normal position of spindles in the homotypic division would occur in the chalazal rather than in the micropylar dyad cell. Megaspores arranged in the form of an inverted "T" are, however, not unknown in other plants. Schnarf<sup>5</sup> quotes Baranow (1926) as having seen such an arrangement in *Drimiopsis maculata*, Paetow<sup>6</sup> has observed it in *Tacca viridis* and Copeland<sup>7</sup> (1938) in *Styrax officinalis*. I have not particularly hunted the literature for this abnormality and would not be surprised if still other cases of a similar nature are present in earlier records.

While new reports of abnormalities and rarities are always to be welcomed, it seems necessary to warn the enthusiast from being overconfident of the priority of his own observations.

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<sup>1</sup> Kajale, L. B., *Proc. Nat. Inst. Sci. India*, 1940, **6**, 597.

<sup>2</sup> Johansen, D. A., *Ann. N.Y. Acad. Sci.*, 1931, **33**, 1.

<sup>3</sup> — *Amer. J. Bot.*, 1931, **18**, 854.

<sup>4</sup> Maheshwari, P., and Gupta, B. L., *Curr. Sci.*, 1934 **3**, 107.

<sup>5</sup> Schnarf, K., *Embryologie der Angiospermen*, Berlin, 1929.

<sup>6</sup> Paetow, W., *Planta*, 1931, **14**, 441.

<sup>7</sup> Copeland, N. F., *Amer. J. Bot.*, 1938, **25**, 771.