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SCENT IN RICE

By K. RAMIAH.

Among the hundreds of rice varieties under cultivation in different parts of India, there are a few known as "scented rices" forming a group by themselves. The variety *sukadas* cultivated in Northern and Western India and the variety *rascadam* cultivated in parts of Madras are typical examples of such scented rices. These scented rices emit a peculiar smell, very similar to the scent of the flower of 'ilupai' (*Bassia longifolia*) tree which finds favour with some people who grow these rices specially. The scented rices are particularly in demand by the Muhammadans in South India who cook them with meat. The special quality of fineness in rice which chiefly refers to the size of the grain has apparently no relationship with scent, as scented rices can be either fine or coarse. But a rice which is fine as well as scented like the *rascadam* of Madras gets a premium of 25 to 50 per cent in the markets over the ordinary rices.

Among the large number of rice collections, (over a thousand), available with the Paddy Specialist, Madras, there are about a dozen scented rices. They vary in grain size, colour of glumes and in flowering duration just like ordinary rices. While the majority of the scented rices are white and non-glutinous, there is also a dark purple (black) glutinous rice that is scented. The experience in Coimbatore has been that the nature of scent is practically the same in all the varieties, there being only slight differences in the intensity of the scent.

It is not definitely known in what part of the grain the scent is concentrated nor to what active principle the scent is due. While the so called scent in rice is invariably associated with the smell that emanates when the rice is being cooked, it is possible to recognise the scent even when the empty husk of the scented rice is boiled in water. The scent, when sufficiently strong, can also be made out by masticating a few husked grains in the mouth. It has been the experience in Coimbatore that the characteristic scent can be detected even when one walks along the bund of the field where a scented rice is growing, particularly when the variety is in flower. The scent at this time emanates, in all probability, from the dehiscing anthers.

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That the presence or absence of scent in rice is a Mendelian character often inherited independently and occasionally associated with

other characters was evident from some of the earlier work done at the Paddy Breeding Station, Coimbatore. A brief account of the information then collected, though it was neither extensive nor conclusive, is given here just to show that it is possible to breed varieties with scent by hybridisation, if there should be any demand for a scented rice of a particular kind in any special locality. Though the smell of the strongly scented rices is not favoured by everyone, there is no doubt that a small amount of scent present in an otherwise fine rice would be appreciated and would command a premium in the market.

In the varietal plot where a number of rice varieties are grown adjacent to each other there is a fair amount of natural crossing among them which can be easily detected in the F_1 generation. In one year a large number of such crosses occurred in the plot of variety *rascadam* mentioned before. These crosses were isolated and grown separately in the following year mainly with a view to study the inheritance of glume colour. Since this variety was growing in the midst of nonscented rices, it was decided as an after-thought to examine the F_1 s for the inheritance of scent as well. After the plants had been examined in the field for glume colour, the heads from some of the families were collected individually and stored in paper covers in the laboratory. An opportunity to examine them for scent did not present itself until a year later.

The procedure adopted for the test was as follows:— A few grains from each panicle were first crushed in an ordinary porcelain pestle and mortar, put into a wide mouthed boiling tube and boiled with water over a Bunsen burner for a few minutes. As soon as the water started boiling, the scent, if it was present, could be easily smelt. It was possible not only to differentiate the scented from the non-scented, but also to distinguish slight differences in the intensity of the scent. While the scent was quite as strong as in *rascadam* in some varieties it was distinctly lighter in others. An attempt was first made to have three groups in the classification, scented, lightly scented and non-scented but it was later reduced to two groups only, scented and non-scented, because of the obvious limitations in the technique followed in the test. Though as far as possible all the testing was done by only one or two individuals, personal equation did play a considerable part in the classification. Moreover after a few boilings had been made, the whole room got impregnated with the special scent and it was a problem to distinguish the non-scented from the scented. There was also an additional disadvantage in that the panicles inside the paper bags, for want of proper care in storing, had been attacked by the rice moth. Such moth eaten grains emitted a special odour often making the classification difficult. The ratios of scented to non-scented obtained are given below.

Natural crosses in <i>rascadam</i> . Family number.	Scented.	Non-scented.	Ratio of scented to non-scented.
625	192	151	1'3:1
626	423	206	2 1:1
627	191	90	2'1:1
628	333	205	1'6:1
629	462	214	2'2:1
634	273	106	2'6:1
636	272	187	1'5:1
637	206	90	2'3:1
638	263	73	3'6:1
Selections from family 637 ; 995	694	299	2'4:1
do. ; 996	474	187	2'5:1

The ratios are so variable and it is not possible to make out the number of factors responsible for scent and it is not surprising if one recognises the limitations of the test employed for the studies. One or two of the families would appear to indicate a single factor difference between the scented and the non-scented groups like 634 and 638 but in the others apparently more than one factor is involved. That the ratios obtained for glume colours were quite different in these two families as compared to the rest gives additional proof that the parents concerned were different. The actual hybrid plants (F_1 s) were not unfortunately examined for scent but an opportunity that presented itself later was utilised to examine the F_1 s of a cross between *rascadam* and a non-scented rice and it was observed that the F_1 did have scent though it was not quite so strong as in the *rascadam* parent.

Later some of the progenies, F_3 s, of a cross between a dark purple (black) glutinous and scented rice and a red, non-scented and non-glutinous rice were examined for the character of scent. The cross was intended mainly for the study of the inheritance of colour of rice and the glutinous character of the endosperm; but the study of scent came in incidentally. As the plants were being examined in the field for rice colour and rice endosperm character, an attempt was made to classify them for scent by chewing a few grains of each plant as they were being crushed for rice examination. Although the chewing test cannot be considered quite as reliable as the boiling test, the ratios obtained in three of the families are given below:—

Families.	Scented.	Non-scented.	Ratio.
2489, 2492 and 2493	247	106	2'3:1

To be sure of the ratios, two other families were harvested individually in paper covers and later examined for scent in the laboratory by boiling tests. The ratios obtained in these two families are as follows:—

Family.	Scented.	Non-scented.
2485	41	29
2488	121	80
Total.	162	109

The ratios would appear to indicate a 9:7 ratio more than anything else. In the case of family 2488 the tabulation for scent was done along with the colour of rice which gave some interesting results.

	Rice colour.			
	Various degrees of purple & red <i>PR</i>	Various degrees of purple and white— <i>Pr</i>	Red <i>pR</i>	White <i>pr</i>
	1	2	3	4
Scented.	85 72	9 19	26 22	1 8
Non-scented	35 48	22 12	11 15	12 5

Previous work in Coimbatore had shown that a cross between purple rice (*Pr*) and a red rice (*pR*) gives 12 purple rice (*PR* and *Pr*), 3 red rice (*pR*) and 1 white rice (*pr*). The expected ratios for scent in the above family on the basis of independence of the factor or factors responsible for scent from those of the rice colour factors are given by the side in italics. X^2 test would show that the deviations of the observed from the expected to be quite significant in groups 2 and 4 i. e., wherever *r* (factor for white rice) is present 'there is a preponderance of scented rice. In the absence of definite knowledge about the number of genes responsible for scent it is not possible to determine the linkage values' but it can be stated that there is some association between white rice and scent.

Summary. Scented rices are characterised by a special smell emitted at the time of boiling the grain. Such smell is found to be present even in the empty glumes and the dehiscing anthers. The scent is found to be a Mendelian character controlled by either one or probably two factors. In one of the hybrid progenies examined there is found an association between scent and colour of rice.

AN UNRECORDED ECONOMIC PRODUCT

Decalepis Hamiltonii, W. & A. Family: Asclepiadaceae.

By K. CHERIAN JACOB, L. Ag., F. L. S.

Tamil: Mahali Kizhanku; Kattu Nannari.

Habit: A climbing shrub.

Habitat: Crevices of rocks.

Distribution: Anamalai Hills (Coimbatore District); hills of North Coimbatore; Kambakkam Hills (Chingleput District); Velikonda Hills (Nellore District); Madanapalle (Chittoor District) and Horselykonda (Cuddapah District).

The fleshy roots of the plant are medicinal, valued as blood purifier and appetiser and also largely used for making pickles in the Coimbatore and the Malabar Districts. But peculiarly enough no mention has been made of the plant in any of the various books dealing with the economic products of India.