

A LONG-GLUMED MUTATION IN RICE

GENERALLY speaking the cultivated varieties of rice, *Oryza sativa* L., possess minute outer glumes measuring from 1.5 to 3 mm. Even the wild rice, characterized by complete shedding of grain, has very small glumes. However, there are certain varieties of *O. sativa* whose glumes are longer, extending up to the upper limits of lemma and palea. In certain of such varieties the glumes are even longer than the spikelets. These are

mentioned by Roschevicz¹⁰ as *Oryza sativa* L. var. *longiglumis* Roshev., in contrast to a distinct species, *O. grandiglumis* (Doell.) Prod., in which the outer glumes are as large and wide as the lemma and palea.

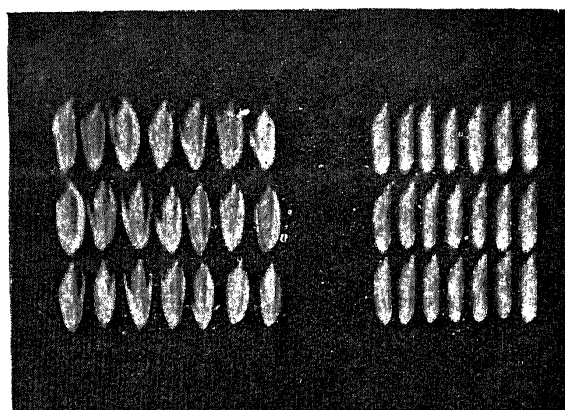
Among the varieties of *O. sativa* the character of long glumes, although morphologically distinct, has not been utilized uniformly by various workers who have made attempts at classification of the innumerable varieties of common rice. Thus, to mention some, Kikawa,⁶ Graham³ and Beale¹ do not utilize the character in their classification of rice, while Tanaka,⁶ Hector and Sharangpani⁴ and Kashiram and Chetty⁵ have used long outer glumes as one of the characters for classification.

Inheritance studies so far reported show that the long-glumed condition is usually recessive. Okada,⁷ van der Stok¹¹ and Parnell *et al.*⁸ each reported dominance of short glumes and a monogenic segregation 3 short : 1 long-glumed plants. Chao,² however, found a 15:1 ratio of the two types of plants respectively. In contrast to these results Ramiah *et al.*⁹ reported a 1:2:1 ratio of short, intermediate and long glumed plants respectively. These authors illustrate the middle class from almost a short-glumed to a long-glumed condition in which the glumes are of varying lengths, but do not exceed the length of lemma and palea. In the third category the glumes extend out over the spikelet, like the original long-glumed parent. Since the F_1 is intermediate, it is rightly concluded by them that the character of long-glumes is partially dominant.

In the Bombay Province, out of many hundreds, only two varieties with long-glumes, Pankhali-Kamod and Rakkibhatta, are known to us. The former is grown in Gujarat and is scented, while the latter comes from Karwar in the southern portion of the Province.

During the crop season of 1940, while making individual plant selections from a bulk sample of an early local Kolamba variety, a plant with long glumes was observed. Since all other plants from the variety had the usual short

glumes, the off-type plant was either a mechanical mixture, a natural hybrid or a mutation. From the shape of its grains, it was clear that no mechanical mixture of such an off-type plant could occur as there is no such variety of Kolamba in existence. This also rules out the possibility of a natural cross. Therefore, it appeared a case of a mutation (Fig. 1).



Long Glumed

Normal

FIG. 1

Twenty seeds from the off-type plant were grown in a pot during the winter of 1940 to observe the breeding behaviour of the long-glumed Kolamba plant. Of these, 18 plants showed spikelets with long glumes, while two plants did not put forth any panicles. It is, therefore, certain that long-glumed condition in this new type of Kolamba arose due to mutation.

Kolamba is one of the most important, fine-grained variety in the northern districts of Konkan, which is the predominant rice tract of the Province. The Agricultural Department in Bombay has released a number of superior strains from this variety. Some of these are replacing even the coarser early and mid-late varieties. Since Kolamba strains are entirely green in vegetative parts, there is no outstanding discriminating character, except differential flowering, which helps to distinguish them from local coarse varieties. If such a conspicuous character as long glumes could be introduced without impairing any of the agricultural characters of the improved Kolamba strains, it would greatly help to rogue the

fields and will also assist in keeping an accurate record of the areas under improved strains of this variety.

B. S. KADAM.
M. V. GADKARI.
G. G. PATIL.

Rice Breeding Station,
Karjat,
June 25, 1941.

¹ Beale, R. A. *Agric. Res. Inst. Pusa Bull.*, 1927, **167**, 1-14.

² Chao Lien Fang, *Genetics*, 1918, **13**, 133.

³ Graham, R. J. D., *Mem. Dept. Agri. Ind. Bot. Ser.*, 1914, **6**, 209.

⁴ Hector, G. P., Sharangpani, S. G., *et al.*, *Ind. Jour. Agri. Sci.* 1933, **4**, 1.

⁵ Kashiram and Sarvayya Chetty, C. H., *Ind. Jour. Agri. Sci.*, 1934, **4**, 618.

⁶ Kikawa, S., *Imp. Uni. of Tokyo*, 1912, **3**, 1.

⁷ Okada, K., *Rept. Jap. Agri. Assoc.*, 1910, **354**, 1.

⁸ Parnell, F. R., Rangaswami Ayyangar, G. N., and Ramiah, K., *Mem. Dept. Agri. Ind. Bot. Ser.*, 1917, **9**, 75.

⁹ Ramiah, K., Jobitharaj, S., and Dharmalinga Mudaliar, S., *Mem. Dept. Agri. Ind. Bot. Ser.*, 1931, **18**, 229.

¹⁰ Roschevicz, R. J., *Bull. App. Bot., Genetics and Plant Breeding (Russian)*, English Summary, 1931, **27**, 119.

¹¹ Stok, van der J. E., in *Handbuch der landwirtschaftlichen Pflanzenzüchtung*, by C. Fruwirth, Berlin, 1923.
