Rice Production and Breeding in Guizhou Plateau

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The Guizhou plateau is located in the south-western part of China at an altitude ranging from 137 to 2,900 meters. It is a rice-growing region with abundant resources of rice germplasm, with a long history and distinctive features of rice cultivation. The acreage of rice is about 800,000 ha distributed in the valleys and small basins between mountains. The yearly average temperature which ranges between 8°and 20℃ with a mean of about 16℃ varies with the regions. The highest temperature in a range of 22-25℃ is observed in July . The rice-growing season extends from April to September. The total rainfall is 1,100-1,300mm per year. Summer drought and autumn cool weather frequently occur. Approximately 50% of the paddy fields are rainfed.

The majority of the paddy soils consists of loess, followed by loam. The main pests and diseases of rice are planthopper, rice borer, blast, and sheath and culm blight of rice. The total output of rice has accounted for about 54 % of the total production of the food crops in recent years. The great majority of the rice cultivars planted belong to the middle season ones. The winter crops cultivated in paddy fields include rape, wheat or green manure. The yield levels per unit area vary with the regions depending on the natural and cultivation conditions. Usually yields of about 4,500-5,200 kg per ha, or exceeding 9,100kg per ha in certain fields can be obtained.

Guizhou is one of the centers of origin of cultivated rice in Asia, and the rice cropping history is as long as that of Yunnan Province. There are three regions where the rice cultivars are distributed based on the elevation: hsien (indica) rice region, hsien-keng mixed region and keng(japonica) rice region. Within the hsien-keng mixed region at the altitude range of 1,400-1,600 meters, there are some varietal forms with a wide affinity that cannot be easily differentiated between hsien and keng. The indigenous rice of Guizhou has special features and many of the glume-pockmarked cultivars can be used to restore the fertility of the cytoplasmic male sterility of wild rice (*O. sativa L. F. spontanea)*. This finding suggests that the glume-pockmarked cultivars are related to wild rice in contrast to the hsien rice of the Yangzie valley and South China.

Guizhou harbours more than 4,000 indigenous cultivars with the following types: hsien and keng subspecies, early and late maturing types,lowland and upland types, glutinous and non-glutinous varieties and varieties with several glume and husk colours. In general, the indigenous cultivars of Guizhou province show a longer basic vegetative growth phase and weaker reaction to temperature and photoperiod. Based on the glume characteristics, upland rice can be divided into two kinds, glabrous and downy. The indigenous cultivars possess some useful characters for breeding such as cold tolerance, acid soil tolerance, large panicles, large grains, high tillering capability, good quality, etc. Our breeding objectives are centered on developing varieties with high yield, good taste and cooking quality, strong composite resistance, good grain-shelled character, and adaptability to the cropping systems.

Since the 1950's rice cultivation has undergone two major transformations, i.e. the change from plants with a tall culm to plants with a short culm and the development of hybrid

rice. Presently of the total acreage of rice, hybrid rice accounts for 14%, traditional improved varieties for 65%, and the rest consists of various native cultivars. Both the provincial and district agricultural research organizations are in charge of rice breeding. Since 1977, 19 improved varieties have been released, of which 16 varieties belong to hsien rice, 1 to keng rice and 2 to glutinous rice. As for the breeding method, 6 varieties were bred by systematic selection, 10 by cross-breeding 1 by haploid breeding, and 2 by radiation breeding.

The rice variety 'Jin Ma Zhan' with a high quality was awarded the national prize by the Ministry of Agriculture, Animal Husbandry and Fishery, P. R. China, in 1986. The rice cropping conditions of Guizhou are considerably different from those of the flat regions.

In conclusion:

1. A complete set of varieties must be developed to meet the various conditions of rice cultivation.
2. For the balanced development of rice production, varieties with both wide and specific adaptability must be considered in rice breeding.
3. It is necessary to identify the objective characters and qualitative scale for rice breeding, and to emphasize breeding efficiency.
4. Both introduced parents and indigenous parents are equally important for cross combinations.
5. Scientific identification of the objective characters must be promoted.
6. Various breeding methods must be used rationally to meet the requirements of different breeding materials.
7. The breeding procedures should be shortened by the application of the advance generation method and biotechnological methods.
8. Breeding, selection and testing should be carried out in various areas.
9. Cooperation at the national and international level should be promoted and the policy adpoted should include both the introduction of new materials and breeding of existing ones.