

Rice Varietal Development For Food Sovereignty: a case of MARDI

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Varietal development has been a mandate of MARDI since the 1970s and until today a total of 44 varieties have been released for planting in the granary areas. The breeding objectives varied in accordance to the needs of the different era. In the 1970s Malaysia started to implement the double-cropping for rice after the Japanese occupation. For successful double-cropping, the varieties must have a maturation period of less than 145 days and be non-photoperiodic. Almost all of the traditional varieties planted at that time were photoperiodic and would not flower until December when the days are shortest.

The first successful non-photoperiodic variety was Mahsuri, developed from a cross between Japonica and Indica, and it was released in 1965. It was an easy shattering variety suited for manual harvesting. Despite its short to medium grain type, it was widely planted because of its excellent eating quality. However, the plants were too tall and prone to lodging. Further, it was susceptible to blast disease. These factors motivated breeders to produce varieties that were shorter and resistant to blast. In the late 1960s and early 1970s, many crosses were made for the improvement of Mahsuri and Ria. Several successful varieties resulted from this programme, including improved Mahsuri, which farmers called by names such as *Apollo*, *Anak Dara* and *Mat Candu*. *Malinja*, *Mahsuri* and *Bahagia*. These varieties were accepted by farmers and were planted twice per year, but they were still prone to lodging since their height were still too tall at 140-150 cm.

Breeding and selection for shorter plants produce rice varieties with culm heights of approximately 100 to 115 cm. These varieties were released to farmers between 1974 and 1990. From 1990 to 2006, selection for semi-dwarf plants was the primary objective. Thus, rice varieties released during those years possessed culm heights between 56 and 90 cm. These varieties showed significant increase in yield and varieties such as MR84, MR219, MR232 and MR253 showed average yields of approximately 6-8 tons per hectare.

Direct seeding was introduced in the 1990s with the aim of increasing production. The plant architecture had to be changed to suit the switch from manual transplanting to direct seeding system. Characteristics such as erect leaves, erect tillers, low tillering capacity, shorter plant height, better rooting structure and panicle-weight type rather than panicle-number type were important breeding objectives in this process. The demand for fine-grained and fragrant rice has remarkably increased the import tonnage which prompted the breeding of specialty rice. Two varieties were released from this breeding programme: MRQ50 and MRQ74.

Apart from yield and plant stature, resistance to pests such as brown planthopper was also improved by introducing resistant genes from the International Rice Research Institute (IRRI) and the Indian Rice varieties such as Ratu Heenathi and Pankhari. Traditional rice varieties such as *Sigadis*, *Tadukan* and *Pongsu Seribu*, which are known to be resistant to blast, were also used in the breeding programme. From its establishment until 2010, MARDI released 33 varieties. Two of the varieties, MRQ50 and MRQ74, are aromatic, fine-grained rice. MR84 was the most successful variety planted between 1986 and 2002, covering almost 97% of the total rice granary areas. MR219 was popular for its high yield and lasted for 20 years and still receive demands from farmers. As agricultural practices and new technologies are introduced, MARDI is well ahead in developing rice varieties and increasing farmers' income and currently, healthier life is the major goal for varietal development.

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