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A Super Rice for the Year 2000 New Look Rice Plant to Break Yield Barrier

Washington, Oct. 29 - Scientists estimate that the world's annual rice output must rise by 60 per cent to reach 760 million tons by 2020 just to keep up with the predicted population growth.

To face this challenge, scientists at the International Rice Research Institute are working on the development of a new ultra-high yielding rice plant that will produce 20 percent to 30 percent more than the best semidwarf rices now grown on most irrigated land.

Dr. Klaus Lampe, IRRI's Director General, announced today at a meeting on agricultural research that the ultra-high yielding variety should be ready in five to eight years and would have a modified architecture, or new look.

It was 25 years ago that scientists at the International Rice Research Institute in the Philippines unveiled its now famous miracle rice plant, IR8.

That semidwarf rice plant was responsible for Asia's Green Revolution and, along with breeding breakthroughs in wheat and corn, averted the predicted famines of the 1960s and 1970s.

The strong stems of the IR8 variety allowed it to produce heavy grain panicles in response to increased nitrogen fertilizer without falling over. Its abundant tillering greatly increased yields, and its insensitivity to the length of the days allowed farmers to grow the rugged semidwarf plant around the rice-growing world at any time of the year.

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Today, rice production in Asia is twice that of 1966. The increased production from semidwarf rices is now estimated to feed 700 million persons.

The great rice production gains of the last two decades came from the irrigated and the best rainfed areas. Now irrigated rice seems to have reached a yield plateau, or maximum possible yield, says Dr. Benito S. Vergara, a plant physiologist at IRRI.

The new ultra-high yielding rice plant will produce fewer tillers, or stalks, than today's better varieties, but almost all will bear panicles, Lampe says. The new rice can be seeded directly or transplanted.

The new rice plant will stand 35 to 40 inches high, and be ready for harvest 100 to 130 days after seeding. Its heavier grains will have better milling quality, and the plant will yield more unbroken grains than today's varieties.

"A different plant type may raise the yield plateau in the dry season from today's nine tons to 13 tons per hectare (2.2 acres)," Vergara contends. "Maximum yield in the wet season may increase from six to eight tons per hectare."

The ideotype plant will have a vigorous root system to draw nutrients from the soil more effectively; its seeds will germinate better and produce more vigorous seedlings, and have better pest resistance.

Crop management must also change with the new plant type, according to Dr. S.K. De Datta, former IRRI agronomist. Most modern varieties were developed for transplanting, but shortages in farm labor and better weeding methods are shifting the trend to direct seeding.

"Direct seeding lowers the cost of getting the crop established," De Datta says. "Higher plant populations will contribute to higher yields, and will be directly related to seeding density, not to tillering ability."

Plant breeders have changed their approach to developing new rice varieties in recent years.

"Instead of incorporating desired characters into an existing plant," says Dr. Gurdev Khush, IRRI's principal plant breeder, "we are breeding a desired ideal plant type by combining traits from various donors."

IRRI scientists have analyzed the plant-type requirement of both transplanted and direct-seeded rice. A low tillering plant type is best for direct-seeded rice.

"Centuries ago, maize and sorghum produced many stalks, but small cobs and heads," Khush points out. "Selection by farmers and plant breeders changed the plant architecture so that today these crops produce only one sturdy stalk that bears large ears or panicles. "A single-stalked rice plant is what we need in the future," he says.