## THE GREEN REVOLUTIONARY SEES A NEW CHALLENGE

AFTER A LIFETIME OF REVOLUTIONARY CROP SCIENCE, M.S. SWAMINATHAN'S DRIVE TO HELP THE WORLD'S POOR IS AS STRONG AS EVER. **ANNA KING MURDOCH** REPORTS.

> th a rare combination of scientific brilliance, humanity, and respect for nature, Professor M.S. Swaminathan is regarded by many as the embodiment of humanitarian science. One of the driving forces behind the Green Revolution, the 79-year-old plant geneticist from South India spoke recently at the Fourth International Crop Science Congress in Brisbane, where he said his quest to improve the lives of the world's poor remained as strong as when he started his career in plant breeding – under the strong influence of Mahatma Gandhi.

> He told Partners that he has no plans to retire because there are too many challenges facing food security – agricultural sustainability, climate change, decreasing yields, worldwide water shortage and the debate about GM foods.

> The challenge now is to find the best ways to combine organic agriculture and the new genetics, he says: "If biotechnology can be promoted keeping in mind the guidelines Gandhi gave, it will become a powerful tool in ensuring sustainable food security in the world."

> Swaminathan's achievements in breeding new crops over the past 50 years can be linked back to the tragedy of the Irish Potato Famine of the 1840s. The blight which caused the deaths of about one million people led to the first genetic experiments to develop pest and disease resistant crops.

> A century later, the young Swaminathan had his own profound reasons for research into disease prevention and yield improvements. When Swaminathan was a child, Mahatma Gandhi attended political meetings at his parents' house. This had a considerable influence on him, and after the 1942-43 famine, when several million Indians perished, he was determined to do what he could to prevent such a shocking tragedy ever being repeated.

> He began his university studies in agricultural science, concentrating on the breeding of new crop varieties, and while undertaking postgraduate work in genetics and breeding, he won a UNESCO fellowship to go to Holland.

> Swaminathan became so specialised in his work crossing frost-resistant potato species from different areas that he was advised to go to Cambridge. There, surrounded by some of the world's best geneticists, he experimented with species from Peru, Bolivia and Chile and tried crossing them with European species.

> After receiving his PhD in genetics in 1952 (Species Differentiation and Nature of Polyploidy in Tuber Bearing Solanum Species), Swaminathan received some lucrative job offers, including one from a US potato chip company offer

ing him a highly-paid job to develop new varieties suitable for chips.

Swaminathan, though, had a radically different ambition to creating the perfect potato chip.

On returning to India in 1954 he eventually accepted a position at a remote rice research post and used the experience to discover how to increase yield. He realised that new hybrid varieties had to be created that could respond to fertiliser. That same year, he was offered a job at the Indian Agricultural Research Institute in Delhi to work on wheat and there he built further on what he had discovered about rice at Cuttack.

The revolutionary work that Swaminathan then began would lead to his 'magical Norin 10 wheat' (with a gene obtained from Dr Norman Borlaug).

"I decided that unless we have varieties that can respond to water and nutrients our yield would be low. However, the older varieties were tall and if you irrigated them they would fall into the water. You require a stiffer, shorter variety because without water you can't apply many nutrients or fertiliser."

Swaminathan started crossing dwarf varieties, bred with a dwarfing gene from Japan, with Indian soft wheat varieties suitable for chapatti and naan breads.

By 1964 he had three dwarf varieties growing on about 500 farms, and between 1964 and 1968, more wheat was produced in India than in all the 4,000 years previously. This was the Green Revolution of India – a country where mass-starvation was otherwise the grim prognosis by western economists.

In the 1980s, Swaminathan turned his attention to rice after being appointed director of the International Rice Research Institute in the Philippines: "It was the same problem; they needed a shorter rice," he says.

The past 50 years have been quite miraculous for India, which has seen life expectancy lift from 30 in 1947 to over 60 now.

However, Swaminathan is worried about future food security. "There has been a great agricultural program in which crop science has played a justly proud part," he told the Congress.

But he said the challenges over the next three to four decades will be as great as they were 50 years ago, requiring just as great an improvement in yields and resource-use efficiency. And among all the technology that needs to be developed and put in place, he urged researchers and policy-makers not to overlook the role and position of farmers.

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