

Profile



Simple faith from a green revolutionary

Despite pervasive concerns, both public and political, of the potentially unknown effects of genetically engineered crops, the revered 80-year-old Indian plant geneticist, Professor MS Swaminathan, is convinced by his achievements that genetic technology is the timely answer to feeding the world's increasing population. **Anna King Murdoch** reports on the experience of a man credited with feeding 70 million people.

The diminutive Indian scientist, Monkombu Sambasivan Swaminathan, who visited Australia late last year for the Fourth International Crop Science Congress, defends the modern science of 'precision breeding' by observing nature.

'Genetic diversity has been the basis of evolution of enormous varieties within species,' he says. 'Transgenic plants are occurring all the time in nature. However, what is now being done with the help of molecular genetics is the creation of novel genetic combinations for specific charac-

ters: for example, our scientists have transferred genes from mangroves to rice in order to breed salinity-tolerant varieties which can help us if there is a rise in the sea level as a result of global warming.'

Though Swaminathan admits that there is still an element of the unknown in this new science – its longer-term effects on human health and the environment – he is confident that with the development of 'clean gene technologies' scientists will be able to accurately assess the risks and benefits over the next few years.

MS Swaminathan continues to inspire generations with his practical and humble philosophy. Brad Collis

This man's whole life has depended on a belief in the ultimate wisdom of this science. It was through his creation of a genetically engineered wheat – 'the magical Norin 10 wheat' – that about 70 million Indians were saved from hunger.

During more than 50 years of work creating high-yield wheat and rice crops, he has received many of the world's most prestigious awards. Acclaimed as one of the 20 most influential Asians of the 20th century by *Time* magazine, along with two other Indians, Mahatma Gandhi and the poet Rabindrinath Tagore, this gentle, alert and ageless man has based his life and work on a plea by Gandhi: 'Recall the face of the poorest and the weakest man whom you have ever seen and ask yourself if the steps you contemplate are going to be of any use to him. Will he gain anything by it? Will it restore to him control over his own life and destiny?'

Best known as the man who created India's Green Revolution, an agricultural renaissance which began in the 1960s, Swaminathan has no plans to retire when there are so many current challenges to maintaining the world's food security: sustainability, climate change, decreasing crop yields, a worldwide water shortage, and the debate about genetically modified foods are inescapable new realities.

The challenge now is to find the best ways to combine organic agriculture and the new genetics, he says. 'If bio-technology research can be promoted, keeping in mind the guidelines Ghandi gave, it will become a powerful tool in ensuring sustainable food security in the world'.

Swaminathan's work breeding new crops is linked back to the tragedy of the Irish Potato Famine of the 1840s. That disastrous potato blight, which caused the deaths of about one million people from malnutrition and mass migration from Ireland, led to the first genetic experiments to produce crops able to resist pests and diseases.

A century later, Swaminathan had his own profound political and personal reasons for choosing to continue genetic research to prevent diseases in crops and increase their yields. Born in South India, he was the son of a doctor who was so respected that he was employed to treat the British generals, a position that protected him through his years supporting the independence movement. Mahatma Gandhi came to political meetings at their house.

During 1942–1943, when Swaminathan was in his teens, several million Indians died from starvation because of a shortage of rice. This tragic failure of a crop led to Swaminathan devoting his life to preventing another famine.

After university studies in agricultural science, during which he concentrated on the breeding of new varieties of crops, he won a UNESCO Fellowship to study in Holland where he became so specialised in 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 crossing species from Peru, Bolivia and Chile, with European species.

In the early 1950s, after receiving his PhD in genetics, Swaminathan received some highly paid job offers in America, including one from a couple with a potato-chip factory in Maine who wanted him to develop new varieties of potato, perfect for chips. But Swaminathan had other plans: 'I wanted to serve my country'.



Left: Swaminathan at work in the rice hybridisation greenhouse at the International Rice Research Institute in the Philippines prior to applying his knowledge to wheat to develop India's Norin 10 hybrid. Right: Continuing his contribution for India and the wider Asian region from Chennai, Swaminathan now runs the Research Foundation established under his name.

Credit MS Swaminathan Research Foundation

Returning to India in 1954, he researched rice and then progressed to wheat at the Indian Agricultural Research Institute in Delhi. Wheat had been grown in India for thousands of years – kernels have been found in the Mohenjodaro excavations in the Hindus Valley from about 2000 BC – but production was still very low in the middle of the 20th century.

Swaminathan began his revolutionary work on a gene that was contained in a semi-dwarf variety of wheat obtained from Dr Norman Borlaug of Mexico, awarded the Nobel Peace Prize in 1970 for his work in fighting hunger. This led to the creation of his 'magical Norin 10 wheat'.

'I decided that unless we have varieties of wheat that can respond to water and nutrients, our yield would be very low. The older varieties were very tall. If you irrigated them they would fall into the water. We required a stiffer, shorter variety. Without water you can't apply many nutrients or fertiliser. Our aim was to make the plant utilise more nutrients.'

In 1964 wheat varieties created using a dwarfing gene from Japan were giving five times the yield. 'I started crossing the dwarf varieties with our own. Chapatti and Nan (Indian breads) require a softer wheat. We had to quickly breed our own variety of wheat using the dwarfing gene.'

Swaminathan experimented on the land of the poorest farmers. 'If you do anything in a very poor person's field all will benefit,' he says. 'If you do something for a woman in a household, the whole family will benefit. I ask: is it pro-nature, is it pro-

poor, and is it pro-women? Then we start work.'

By 1964 he had three varieties growing on about 500 farms with practising farmers using the now-obsolete technology of camels and a Persian water wheel to irrigate. The average yield was five tons per hectare as opposed to 1–1.5 tons. 'There was so much clamour for seeds as a result.'

Between 1964 and 1968 alone, more wheat was produced in India than in all the 4000 years previously. This was the 'Green Revolution' in a country where mass-starvation had been so confidently predicted by Western economists.

Although this has been a miraculous 50 years for India, with the average life span rising from 30 to the early 60s, there is now a disturbing new trend emerging – declining crop yield. Referred to as 'the fatigue of the Green Revolution' Swaminathan attributes this decline largely to the deficiency in the soils of micro-nutrients like iron, boron and zinc, caused by a lack of balanced fertilising and high salinity.

Economic reasons are also contributing to lower food production, he says. 'In many places, farmers suffer if they produce more, since there is no price stabilisation.'

He warns that as we move forward onto the brave new frontier of sustainable food production 'the farmer is not to be overlooked'.

More information:

The MS Swaminathan Research Foundation:
www.mssrf.org

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