

Six decades and counting

Asian Seed Magazine recently had the honor to sit down with the celebrated **Dr Raj S. Paroda**, for an enlightening online chat. A highly accomplished Indian agricultural scientist and research manager, now 78, he played a pivotal role in the establishment of both the **Asia and Pacific Seed Association (APSA)** and the **Asia Pacific Association of Agricultural Research Institutions (APAARI)**.

Dr. Paroda has made valuable contributions in the field of agriculture both as a researcher and an able administrator for nearly six decades. His contributions in the field of plant breeding and genetic resource management are globally recognized. During the period 1994-2001, Dr. Paroda spearheaded and modernized the national agricultural research system (NARS) as Director General, Indian Council of Agricultural Research (ICAR) and Secretary, Department of Agricultural Research and Education (DARE), Government of India. Further, he has been engaged in developing the seed industry as well. (See full bio on page 43, and read on for insights from the man himself, touching on the seed sector's past, present and future in the Asia-Pacific region, among others)



Dr RS Paroda has had a seasoned career in the seed industry, spanning more than six decades.

Science to Serve the Society

Dr Paroda's pursuit of agriculture reflects his desire to give back something to society. Scion of agriculturalists in 'the land of kings' – Rajasthan, a relatively dry area of sandy loam soil where rains hardly average more than 500mm annually and the main crops cultivated are pearl millet, sorghum, maize, wheat, pulses, rapeseed mustard, groundnut and cotton – young Rajendra was inspired to help family members "do agriculture a bit better than what they had been able to do, because of lack of knowledge and new options." Agriculture,

however, was not so well respected among his peers, who mostly chose studies in medical or engineering fields.

Nonetheless, this 'green' path proved a wise and timely decision, affording opportunity for the aspiring young student to "understand agriculture as a science." Obtaining a post-graduate degree from the prestigious Indian Agricultural Research Institute (IARI), in New Delhi, he said, was rare for young students pursuing agriculture in those days, and perhaps it was a *fait accompli* that brought him in contact with two of

the key drivers of India's famed Green Revolution: Dr Norman E Borlaug and Dr MS Swaminathan.

As a result, from 1964 to 1968, he was literally "working in the fields of the farmers sowing the seeds of the Green Revolution."

During the early 1960s, with the Cold War at its height and the major powers busy building bombs and bunkers, farmers and scientists in India – and later their counterparts in other South and Southeast Asian countries – were building the foundations of modern (and better) mechanized

agriculture; and it all began with seed.

As the Green Revolution got underway, Dr MS Swaminathan became the Director General of the Indian Council of Agricultural Research (ICAR) (a position to which Dr Paroda later succeeded) with remarkable success: "By 1968," Dr Paroda observes, "India produced five million tonnes of extra wheat owing to miracle dwarf wheat varieties, which were photo-insensitive and thus more responsive to fertilizer, irrigation and good agronomic management inputs."



Dr Paroda says the Green Revolution would never have been possible had not public sector seed companies been established at central and state levels – such as India’s National Seed Corporation (NSC), established in 1963, and, later, State Seed Corporations (SSCs) in different Indian States.

Subsequently, private sector seed companies played an important role.

Soon after joining ICAR as Director of the National Bureau of Plant Genetic Resources (NBPGR) in New Delhi, in 1985, Dr Paroda furthered the nascent and still tenuous revolution in Indian farming by establishing the most modern genebank – now the second largest in the world, with more than 400,000 crop plant accessions conserved. Later, he was responsible for bringing in the New Seed Policy while working as Deputy Director General looking after Crop Science activities, which triggered growth of the private seed sector in India. He laid great stress on hybrid technology, including single-cross maize hybrids and rice hybrids. Dr Paroda initiated the policy of sharing public-bred hybrid parental lines, breeders' and foundation seeds, thereby ensuring easy availability of better seed to millions of smallholder farmers while raising the productivity of several crops.

To ensure access to innovation in the private sector through stronger intellectual property rights, Dr Paroda as Director General of ICAR, was instrumental in drafting and finalizing India’s "Protection of Plant Varieties and Farmers’ Right Act (PPV&FRA)" in 2001, which prompted seed sector growth exponentially and spawned many thriving, private national and multinational seed companies.

"Since I was myself a student of plant breeding," he notes, "I recognized the importance of partnership with the private sector, without which quality seeds of improved varieties – especially the hybrids – would not reach end-users (mainly resource-poor farmers). In retrospect, I am pleased that the Indian seed sector has grown and is playing a significant role in increased production and productivity."

Regarding India’s modern genebank, he said: *"The most modern building, equipment and facilities, and the training of more than a hundred scientists and technicians in modern US laboratories, came through US\$24 million in support from USAID – which I was fortunate to successfully negotiate."* The project, he said, *"would otherwise not have been easy to*



Dr RS Paroda at APSA's General Annual Meeting during the 1995 Asian Seed Congress in New Delhi, India.



accomplish."

After creation of the genebank, he was charged with national oversight of all crops in his role as ICAR Deputy Director General (DDG) of Crop Sciences: *"That’s when hybrid rice and BT Cotton came in – initiatives that made all the difference in faster growth for the seed sector as well as crop production and productivity."*

Other Lasting Initiatives

In 1993 Dr Paroda was appointed the UN’s Food and Agriculture Organization (FAO) Senior Regional Plant Production and Protection Officer in charge of the Crop Program in Asia and the Pacific: *"At that time, I was fortunate to be associated with two new initiatives to build agricultural partnership and cooperation in the region."*

First came the Asia-Pacific Association of Agricultural Research Institutions (APAARI). Established in December 1990 at FAO’s Regional Office for Asia and the Pacific in Bangkok, APAARI had as a main objective to promote partnership in Agricultural Research for Development (AR4D) among the National Agricultural Research Systems (NARS) and International Centers in the Asia-Pacific. Dr Paroda served as APAARI Executive Secretary for 22 years, from 1992 till 2014, in the process building it into a vibrant regional forum.

The second initiative was for establishing stronger seed sector cooperation between public and private regional seed organizations: *"We had a seed expert as consultant, Mr Mogens Lemonious, who was working in the FAO Regional Office, Bangkok,*



Dr RS Paroda (center) with Dr KL Chadha, then Deputy DG (Hort) of ICAR (left) and Mr Mogens Lemonius (right).

where I was his counterpart in the Crops Division,” Dr Paroda recalls. The pair’s discussions on need for a regional forum involving the private sector ultimately led to APSA’s founding in 1996, with support from the FAO, the Thai government (via its Seed Division, then under the Department of Agricultural Extension or DOAE), and the Danish International Development Agency (DANIDA).

Reflecting on the association’s establishment, Dr Paroda lauds “the commitment, devotion and leadership of Lemonius, APSA’s founder, who, along with the late Dr KR Chopra, APSA’s second President, and myself wrote APSA’s constitution, seeking the advice and support of eminent seed experts as Simon Groot and Manas Chiaravanond.” He affirms that the government of Thailand’s commitment to the APSA project was crucial to establishing the organization’s headquarters independently in Bangkok – whereas APAARI,

meanwhile, continued to be headquartered in the Bangkok FAO office.

“To tell you frankly,” he exclaimed, “I had to struggle a lot to establish APAARI and build its membership. APSA’s founding, on the other hand, generated great enthusiasm among seed sector groups, both organized and unorganized,” said Dr Paroda.

“In retrospect, both these institutions were needed,” he explained. “If they had not been established at that time, what would the situation be today? We know how critical it is to understand the seed market, opportunities for globalization, and the harmonization of seed laws: all are important issues,” and it is for the purpose of addressing them that such organizations as APSA were put in place.

APSA today is the world’s largest regional seed association.

Always Something New

“It has been always my desire,” Dr Paroda says, “that even if I was holding a position for a short period, that something new should be done for the system – not just work to run the show.” As Director of the National Bureau of Plant Genetic Resources, “I saw the need for a genebank. When I went to the FAO, the need for two institutions was felt and they were created. When I was associated with CGIAR, we thought of having a Global Forum on Agricultural Research (GFAR), which then got established at the FAO in Rome, and of which I was founding President. After only two year’s stint with FAO, Bangkok, I came back to India as Director General of ICAR. There, during a tenure of around seven years, I established more than 30 new institutes.”

Dr Paroda points out that if institutions such as ICAR and persons like Dr Norman Borlaug, Dr MS Swaminathan and Dr AB Joshi were not there, “Probably nothing would

have happened. So we do need institutions and partnerships at the regional, national and local levels.”

He expressed satisfaction that APSA and APAARI are presently working together to develop a [project proposal to strengthen regional capacity-building for phytosanitary standards](#).

Regarding other opportunities for cooperation, he has encouraged APSA to work closer with the International Seed Testing Association (ISTA) on its regional penetration and engagement initiatives, which especially benefit smaller countries having limited seed-testing capacity. ([See also, ISTA-APSA MoU signing news on page 32](#))

Harnessing Heterosis

Highlighting another priority, Dr Paroda says APSA should lay greater emphasis on increasing improved hybrid foodgrain crop and vegetable seed replacement rates to increase production

Gene Bank Facility at NBPGR



Longterm Storage Facility

and productivity, “which has to be done by catalyzing the private seed sector.” APSA could facilitate the process by pressing for harmonization of intellectual property rights (IPR) protection and seed laws throughout the Asia-Pacific countries.

As an example of how important increasing replacement rates is, he said that after single-cross maize hybrids were first released in India in 2001, production doubled in just ten years’ time: “And it can be further doubled if the replacement rate is enhanced from 60 percent at present to 95 or 100 percent.”

Germplasm Access

Dr Paroda’s name is attached to two genebanks, the International Crop Research Institute for Semi-Arid Tropics (ICRISAT) has named its seed repository in Patancheru, Hyderabad as the ‘Raj S. Paroda Genebank’. A genebank at the Agricultural Research Institute in Kazakhstan is also named in honor of Dr Paroda.

Because improving germplasm access is a major concern for the private seed sector in the Asia-Pacific region, Dr Paroda observes that “APSA could organize – in partnership with other bodies – a Regional Consultation on Genetic Resource Conservation and Management Systems involving genebank managers.”

“There is a justified concern,” he says, “that they don’t get genetic resources, due to new laws that have come up after CBD. Also there are concerns regarding access and benefit sharing (ABS) under the Nagoya Protocol. APSA can lead

CROP	ASSEMBLY		DISTRIBUTION			
	RECEIVED	COUNTRIES	SEEDS	HOUS	BOXES	COUNTRIES
SORGHUM	38774	91	219164	126841	121817	104
PEARL MILLET	21594	50	48944	59558	29836	78
CHICKPEA	19179	59	171888	67147	53891	83
PIGEONPEA	13832	74	77488	45658	20743	110
GROUNDNUT	15419	93	82700	44495	49606	92
SMALL MILLETS	10193	7	3354	34237	18617	56
TOTAL	1167	307	601538	307936	294509	142

SAFEGUARDING THE WORLD'S BIODIVERSITY

Dr Paroda at the ICRISAT Genebank, which was named after him.



The Honorable Dr Manmohan Singh (right) – 13th Prime Minister of India – presents the Dr Joshi Memorial Award for the year 2011-2012 to Dr RS Paroda, then the Chairman of TAAS New Delhi, recognized for excellence in the field of Agricultural Research and Education.

the process of devising workable, clear models for sharing benefits. A consultation by APSA to deliberate these issues involving all stakeholders could therefore be a high priority.”

Forward Outlook

Addressing a lack of interest in farming among millennials and the latest generation of ‘zoomers’, Dr Paroda said: “All the time I have been telling young students to embrace agriculture as a science. Don’t consider it only a way of life.”

Science must be in place to deal with forthcoming agricultural and environmental challenges: “For that we need knowledge and better

competence,” he believes. “In that context, we need to motivate youth. I have always believed that, “One can succeed in anything if acting for the society, not for oneself.”

“Look, your farmers are always looking for better knowledge, better seed, better technology, hand-holding, technical back-stopping,” he says, “and that’s what agricultural science and we scientists can provide.”

“So I have no regret. I feel satisfied today that India, from begging-bowl status has emerged as one of the major agricultural exporting countries.

“In the end, it all starts with seed.” 🌱

Dr Rajendra Singh Paroda

Bio Summary

Born on 28th August, 1942, in Ajmer, Rajasthan, India, Dr Rajendra Singh Paroda was the eldest of Shri Ram Karan Singh and his wife Smti. Indira Devi's five children.

Former Director General of the Indian Council of Agricultural Research (ICAR) and Secretary of the Department of Agricultural Research and Education (DARE), Government of India, he was General President of the Indian Science Congress Association (ISCA) during 2000-2001 and National Academy of Agricultural Sciences (NAAS) President from 1998-2000. Paroda is known as the 'Gene Guru', and two principal genebanks – in Pattancheru, India and in Kazakhstan – are named after him.

He received his Bachelor of Science (Agriculture) degree from the University of Rajasthan in 1962; Master of Science (Agriculture) from the University of Udaipur in 1964; and PhD from the Indian Agriculture Research Institute (IARI), New Delhi, specializing in Genetics and Plant Breeding, in 1968.

From 1968-70, Dr Paroda was Commonwealth Post Doctoral Fellow at the University of Wales, Aberystwyth, Wales. He became Director of India's National Bureau of Plant Genetic Resources in 1985. There he established one of the world's most modern genebanks.

From November 1987 to 2001, he was the Deputy Director General (Crop Sciences), later Director General of ICAR and Secretary of DARE, Government of India, during which period he modernized the Indian agricultural research system.

Ohio State University in the US and many (about 17) Indian State Agricultural Universities (SAUs) have conferred him with honorary doctorate degree.

Dr Paroda headed the Forage Breeding Program at CCS Haryana Agricultural University in India, overseeing release of at least 12 new varieties for nation-wide adoption. Other notable work included establishing a model for studying synchrony in cereals; prediction models based on genotype-environment interaction studies in cereals and forages; and biometrical studies in cereals to establish the genetic architecture of yields and related attributes in wheat, barley and a number of forage crops.

He has published over 250 research papers and edited more than 20 books.

Other Attainments: Dr Paroda was instrumental in revamping the National Agricultural Research System (NARS) through several policy and organizational reforms, including the establishment of >30 new institutions throughout India. He served as founding Chairman of the Global Forum on Agricultural Research (GFAR) from 1998 to 2002. He also served as Chairman and Vice-Chairman of the ICRISAT Governing Board and Member. He also served on the Board of CABI, London and on Advisory Committee of ACIAR, Canberra and on Board of Trustees of IRRI. He also served for more



than two decades as Executive Secretary of Asia-Pacific Association of Agricultural Research Institutions (APAARI).

As Chairman, Farmers Commission of Haryana, Chairman of the Working Group on Agriculture, and as a member of the Rajasthan Planning Board, Dr Paroda worked for the general welfare of farmers. Presently he chairs the Trust for the Advancement of Agricultural Sciences (TAAS).

He was awarded in 1998 India's Padma Bhushan (or Lotus Decoration) medal – the nation's third highest civilian honor – for his contributions in the category of Science and Engineering. Other awards and honors include: the Rafi Ahmed Kidwai Memorial Prize (1982-83); the ICAR Team Research Award (1984); the FICCI Award (1988); the Om Prakash Bhasin Award (1992); a Special Asia Pacific Seed Association Award (1995); the Dr BP Pal Memorial Award by NAAS and the Dr Borlaug Award.

Dr Paroda is a Fellow of the National Academy of Agricultural Sciences, New Delhi; of the Indian Academy of Sciences, Bangaluru; of the Russian Academy of Agricultural Sciences; of the Third World Academy of Sciences (TWAS); and of the academies of Agricultural Sciences of Armenia, Georgia and Tajikistan. He is an Honorary Member of the prestigious Crop Science Society of America (CSSA) and of the American Society of Agronomy (ASA). He was also the President of Indian Science Congress (2001) and the President of National Academy of Agricultural Science (NAAS) from 1996-2001.

During his career, he has been elected President of over a dozen Indian scientific societies. He is current President of the Indian Society of Plant Genetic Resources (ISPGR).