

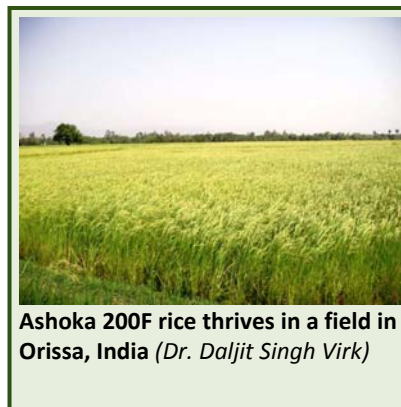
## Ashoka rice: selecting for success with farmer participation

### Key fact:

**Two specialised rice varieties developed in India have become the first widely adopted modern varieties on India's uplands. The varieties, developed in response to the expressed needs of upland farmers and involving farmers in selection processes, offer better quality, earlier harvest, and improved drought resistance.**

### Summary:

Rainfed upland rice farmers have little use for modern rice varieties bred for irrigated and fertile lowlands. However, two rice varieties (Ashoka 200F and Ashoka 228) developed in the early 2000s have achieved unprecedented levels of adoption in eastern India's uplands. The varieties were developed by involving farmers in establishing breeding priorities, known as client-oriented breeding (COB), and by involving them in selecting and testing processes, known as participatory varietal selection (PVS). These farmer-oriented breeding approaches offer dual benefits as they reduce breeding time, and produce varieties in response to farmers' articulated needs. The result has been to provide valued long grains and cooking characteristics, early maturity, drought tolerance and improved yield in these two varieties of rice.



**Ashoka 200F rice thrives in a field in Orissa, India** (Dr. Daljit Singh Virk)

A recent impact assessment conducted under DFID's Research Into Use (RIU) programme has revealed that 95 per cent of farmers who received seed in four states continued to grow the varieties 4-6 years later from their own saved seed. High adoption levels in project villages were matched by those in neighbouring villages, showing that the rice varieties had spread informally from farmer to farmer. It is estimated that some 400,000 hectares of Ashoka rice may eventually be grown by nearly 3 million households across central India.

### Facts & figures<sup>1</sup>

- ❖ Only 46% of modern rice varieties released between 1965 and 2000 in India were developed for rainfed farming. Only 19% of these were intended for uplands.
- ❖ In the five districts surveyed by the RIU impact assessment in 2008, Ashoka rice was planted on 57-91% of adopters' upland fields and 5-79% of their medium lands.
- ❖ Ashoka varieties were the first modern upland varieties to be adopted by many farmers in these areas.
- ❖ 68 per cent of adopters of Ashoka rice were below the poverty line indicating that the varieties are well suited to the needs of resource-poor farmers.
- ❖ A kilo of Ashoka rice grain sells for almost double that of local varieties (11-12 rupees instead of 6 rupees).
- ❖ Half of farmers who grew an Ashoka rice variety reported increases in rice grain self sufficiency (by 17% or one month) or increases in grain sales (by 46% or 150 kg).
- ❖ The drought resistance of the Ashoka varieties is a key source of resilience against climate change.
- ❖ PVS has now been widely implemented and institutionalised in India, where projects such as Ashoka rice dissemination, which involved the state government of Madhya Pradesh, have led to official recognition of the approach as a useful research and extension activity.

## Ashoka rice: selecting for success with farmer participation

In South Asia the Green Revolution of the 20<sup>th</sup> century boosted rice and wheat production to amazing levels, but the much-celebrated feats of plant breeding were not helpful to all farmers. New crop varieties were developed for high input growing conditions, while small farmers, with few resources and marginal land, continued to grow lower-yielding local varieties. To benefit smallholder farmers, DFID-funded plant breeding programmes have used client-oriented breeding (COB) and participatory varietal selection (PVS) to develop and test crop varieties suitable for all.

Upland rice varieties (Ashoka 200F and Ashoka 228) have been two of the great successes of the new client-oriented approach. Developed collaboratively by India's Gramin Vikas Trust (GVT), Bangor University's Centre for Arid Zone Studies (CAZS, now known as CARIAD), and Birsa Agricultural University with funding from DFID, the varieties were bred to meet the specific needs of participating farmers.

Involved in selecting varieties, local farmers grew trials of many similar varieties in their fields and chose those that most appealed to them. Those varieties most favoured by farmers in the tough environment of the uplands were subsequently released as Ashoka 200F and 228 by Birsa Agricultural University in Jharkhand state, eastern India, in 2001.

Upland rice is grown on drier, rain-fed land, and provides essential income for countless small farmers in the region. However, upland rice was one of the most important crops overlooked by the Green Revolution in South Asia, which concentrated single-mindedly on semi-dwarf rice for lowland, irrigated cultivation. With upland farmers taking an active role in the breeding process, the Ashoka rices have become the first improved varieties to achieve widespread adoption in upland fields.

Where other improved varieties have failed to be adopted on a large scale, Ashoka rice has achieved significant adoption because it offers a whole package of benefits that upland farmers need most. While public sector plant breeders have tended to focus on yield, Ashoka varieties have proved particularly popular because of their earlier harvest dates, better drought resistance, and a preference for the taste and quality of the rice. Their earlier maturity has enabled some farmers to grow a second annual crop, while women appreciate the grain for cooking faster, requiring less fuel.

A recent impact assessment has shown that the extent of adoption of Ashoka rice has exceeded all expectations. Over 95 per cent of farmers who received seed during the original dissemination are continuing to grow the varieties 4-6 years later, planting the rice on 75 per cent of suitable upland acreage. In comparison, the only other public sector-developed upland variety was found growing in one district of Jharkhand: a variety called Vandana, which was grown on only five per cent of upland rice area 16 years after its release. Meanwhile the Ashoka varieties, with their better grain quality, already made up an estimated 40 per cent of the same district's upland rice.

In the five districts surveyed, the assessment estimated that around 200,000 farmers were growing an estimated 30,000 hectares of Ashoka varieties. If its adoption had been similarly high across the four states in which it was released - Jharkhand, Rajasthan, Gujarat and Madhya Pradesh - it is highly likely that some 400,000 hectares of Ashoka rice would be being grown by nearly 3 million households today.



**A female farmer of Jharkhand comparing her harvest of a local variety (left) and Ashoka 200F (right) (Dr. Katherine Steele)**

Due to the informal seed system by which farmers provide seed to other farmers, researchers are also confident that the rice varieties have spread beyond the four states where they were introduced. More than a third of farmers interviewed in the assessment who grew an Ashoka variety distributed seed to other households from the 2007 harvest. In



**Rajinder Dhan (centre), a farmer and COB participant in Jharkhand, showing harvested grain (Dr. Daljit Singh Virk)**

group discussions, farmers in every study village reported distributing seed to an average of two new villages. And these secondary villages showed the same high levels of use, despite the lack of any formal seed supply.

Since the beginning of Ashoka rice development, the use of the COB and PVS farmer approaches have spread in the region. Three Indian organizations - GVT, Action for Social Advancement (ASA), and the state government-run Madhya Pradesh Rural Livelihoods Project - have used PVS strategies to introduce new varieties of 14 crops, including legumes, cereals, and even coriander.

State agricultural universities have also applied PVS in a further five crops. The yield advantages of these varieties are typically 15-40 per cent over the crops grown traditionally. In the process, some 240,000 farmers have been directly involved in selecting these varieties to best meet their needs and tastes, ensuring that the breeding efforts are in the service of all.

#### **Testimonials:**

- **Mr. Dalip Pani, farmer, Orissa, India.** “Ashoka varieties have transformed me from subsistence to surplus farmer. With the increased income from seed sale of Ashoka varieties I now own my own tractor and irrigation pumps. I now grow many crops in both seasons. My social status has been enhanced and I am now a nodal person for various government extension agencies.”
- **Mr. Rajinder Dhan, farmer and COB participant, Jharkhand, India.** “Farmers who adopt Ashoka varieties continue to grow them for their earlier maturity, excellent drought tolerance in the uplands and high grain quality. I use Ashoka rice for special occasions because of its good cooking quality.”

## Additional case study information

### Costs and benefits:<sup>2</sup>

- The total cost of developing and distributing the Ashoka varieties was less than £500,000.
- The participatory breeding and testing process was far quicker than in conventional systems, reaching farmers in about 4 years instead of ten or more.
- Self-help groups of farmers in villages in Orissa produced seed in the 2001-2002 off-season. The majority of this seed was procured by GVT and distributed to farmers in more than 600 villages and to other agencies in 2002. It was also distributed to NGOs and state departments of agriculture working in Jharkhand, Orissa and West Bengal.
- In the estimates of the impact study, the two Ashoka rice varieties together could produce an overall benefit of £17 million per year to direct and indirect beneficiaries in the five states surveyed.

### DFID contribution to research:

The development and dissemination of the Ashoka varieties was made possible primarily by financial and in-kind contributions made by DFID bilateral development projects, and by funding from DFID's Plant Sciences Research Programme.

### Research milestones:

- 1996 Gramin Vikas Trust (GVT) identifies variety Kalinga III as a rice popular with upland farmers, but the variety has some drawbacks, such as lodging.
- 1997 Bangor University's Centre for Arid Zone Studies (CAZS, now CARIAD) plans the cross of Kalinga III with improved IRRI variety IR64 and arranges an agreement with IRRI to make the cross.
- 1998 First generation of selection in Jharkhand state, India.
- 1999 GVT and CAZS tests advanced lines of the cross that led to Ashoka varieties in PVS trials.
- 2001 Ashoka varieties are disseminated for the first time in selected villages by GVT.
- 2003 Ashoka varieties are officially released in Jharkhand state.
- 2005 Release is scaled up in eastern India with support from the Rockefeller Foundation, and the varieties are notified by the Government of India for certified seed production.
- 2006 Madhya Pradesh Rural Livelihoods Project dissemination of Ashoka varieties with support from DFID and the Madhya Pradesh state government.
- 2006 Drought is declared in parts of India. In Hazaribagh district, Jharkhand, all crops are affected, and in some villages only farmers growing Ashoka rice produce a harvest.
- 2009 DFID's Research Into Use (RIU) component conducts an impact study of the Ashoka varieties.

### Photo credits:

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### Links:

Gramin Vikas Trust: [www.gvtindia.org/](http://www.gvtindia.org/)

Bangor CARIAD: [www.cazs.bangor.ac.uk/ccstudio/WhatsNew/cazsWhatsNew2.php?ID=-8](http://www.cazs.bangor.ac.uk/ccstudio/WhatsNew/cazsWhatsNew2.php?ID=-8)

### Main reference:

Conroy, C., J.R. Witcombe, D.S. Virk, M. Basu, M. Buchy and A. Dey, (2009) *New Upland Rice Varieties for India*. Rainfed Agriculture Impact Study No. 1. Monitoring Impact Assessment and Learning Component (MIL) 2.2 of the Research into Use Programme (RIU), DFID

### Other key references:

Conroy, C., (2009) *Institutional Innovations in India's Crop Improvement System*. Rainfed Agriculture Impact Assessment Study No. 5. Monitoring Impact Assessment and Learning Component (MIL) 2.2 of the Research into Use Programme (RIU), DFID

Virk, D.S. and J.R. Witcombe, (2007) *Trade-offs between on-farm varietal diversity and highly client-oriented breeding - a case study of upland rice in India*. Genetic Resources and Crop Evolution, 54:823-835

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<sup>1</sup> Facts and figures sourced from: Conroy, C., J.R. Witcombe, D.S. Virk, M. Basu, M. Buchy and A. Dey, (2009) *New Upland Rice Varieties for India*. Rainfed Agriculture Impact Study No. 1. Monitoring Impact Assessment and Learning Component (MIL) 2.2 of the Research into Use Programme (RIU), DFID

<sup>2</sup> Conroy, C., J.R. Witcombe, D.S. Virk, M. Basu, M. Buchy and A. Dey, (2009) *New Upland Rice Varieties for India*. Rainfed Agriculture Impact Study No. 1. Monitoring Impact Assessment and Learning Component (MIL) 2.2 of the Research into Use Programme (RIU), DFID



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