

How partnership built ASI and ISA

Manual labour may be the cornerstone of most African Agriculture but it often falls disproportionately on women and children.

A partnership between WARDA, NARS and private sector organisations in Senegal is lessening the load of drudgery and improving the usable yield and marketability of rice.

But, not only is this partnership, stemming from pioneering work at the Sahel Station in St-Louis, already benefiting five other West African countries with thresher-cleaner technology, it is the foundation of new developments in low-cost harvesting.

Haphazard harvesting and rudimentary post-harvest handling were identified in the mid-1990s as major problems in the Senegal River Valley by field surveys which attributed post-harvest crop losses of up to 35% to the inefficiency of manual threshing. Poor harvesting means not all grain or potentially useful straw is harvested. Such losses are compounded if threshing is inefficient at separating the grain or it produces damaged and split grains susceptible to storage damage and of lower marketable value.

Manual threshing is labor-intensive and backbreaking and mainly carried out by women rice farmers. Expensive and unreliable combined harvesters failed to provide an answer and the only available small-scale thresher in Senegal was not very efficient as it could not properly separate grains from straw after threshing.

Partnership, first between WARDA and IRRI in the Philippines, identified a prototype Asian rice thresher-cleaner, and then embraced national researchers in ISRA and SAED, local master craftsmen and end-users to develop an African technical solution that is affordable, locally-constructed and acceptable to everyone in the rice-growing community, including women.

Where manual threshing yields one tonne of paddy per day, the ASI—taking its name from ADRAO-SAED-ISRA—produces six tonnes of paddy. With a grain-straw separation rate of 99 percent, no additional labor is required for sifting and winnowing. A high internal rate of return (IRR) and benefit cost ratio made the ASI extremely attractive for use in the Senegal River valley, with an average purchase price of 2.8 million FCFA—around US\$ 5000. Even at this price, which is several times the cost of similar non-adapted Asian machines, and taking a pessimistic view on seasonal performance, the ASI had an IRR of just under 50 % in the original financial analysis.



Local craftsman working on the prototype ISA harvester.

When the ASI works 90 days, the benefit cost ratio reaches 2.3, well above standard guidelines. The economic life of an ASI is assumed to be five years, with financing over three years, and a salvage value of 30% of the purchase price. In practice, the ASI's real-life performance ensures the initial cost and debt charges can be readily paid off earlier.

ASI has become a big hit in the Senegal River valley since its commercial release in 1997 (see Table 3) and its contribution was recognized when the President of Senegal presented the ASI team with his special prize for science research. More than 50% of the total paddy produced in Senegal is now threshed with the ASI thresher-cleaner, and the proportion of grain threshed by ASI is increasing in other countries where similar partnerships have developed machines to suit local needs and capacities.

Overall labor demand is lower with the ASI, eliminating one of the most back-breaking tasks for women and children, and freeing family labor for other activities. For the investor, the potential returns to the ASI are greater than with the alternatives under similar conditions. Faster working lessens post-harvest delays that can affect grain quality. Higher quality grain is a prerequisite for competitiveness against imports that cost African countries much valuable foreign exchange.

ASI can even process wet straw, and is equally effective whether the rice has been manually cut or machine harvested. Local artisans (AGRITECH, Momar Dieng) and a medium-scale agricultural machinery factory (SISMAR) built the ASI prototypes for field testing with local farmers' organizations to ensure acceptability when the new machines were finally rolled out.

Africa Rice Center, ISRA and SAED are now using this ASI partnership model in an alliance for a further development of rice harvesting technology. This time the partnership is focused on adapting a small-scale harvester from IRRI. Successful field trials of the harvester took place in Senegal in 2005 and the first production versions are expected to roll out in time for next year's rice harvest. It is possible to transfer the 12 hp ASI engine to the ISA harvester to save costs, and the engine could also be used for powering a milling machine.



Table 3: Spillover from the ASI thresher cleaner

Country	Local name	Partners	Machines in use	Use rate (%)
Senegal	ASI	WARDA, ISRA, SAED, SISMAR, GRITECH, Local artisans, Producer groups	>250	75
Mauritania	SAC	SONADER, CNRADA, EL MALLY, GIE	>50	15
Mali	AC-IER	IER, Office du Niger, local artisans	>100	10
Burkina Faso	ANADI	INERA, CGF, PAFR, producer groups, local artisans	10	10
Ghana	GHAVIWA-TC	MADR, World Bank, KAPONG Project	11	NA
Côte d'Ivoire	ASI	ANADER, Local artisans	7	NA