

Impact on Farm Economics of Changing Seed Use A Study in Jharkhand



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Introduction

Till recently, Jharkhand's farmers overwhelmingly cultivated traditional varieties of rice along with some high yielding varieties or HYVs. Since the late 1990s, a third type of rice seed – the private sector owned hybrid rice is available and is actively promoted by the agriculture university and the state's agriculture department.

The history of the development of improved rice varieties in India dates to the first half of the 20th century when pure line method of selection enabled the release of some 445 indica varieties¹. From 1965 an inter-racial hybridisation programme between semi-dwarf Taiwanese types and indica types of rice led to the development of Taichung (Native) - I, and the release of the Padma and Jaya semi-dwarf varieties of rice. Thereafter began the prolific release of what are now known as high yielding varieties (HYVs) with 123 varieties released in 12 years as compared to the 51 high yielding varieties released in the previous four decades. The semi-dwarf varieties were generally found to be superior to the tall traditional varieties in efficiency of grain production. Their short height also made them resilient to lodging in strong winds, so the grain was not lost when the plant fell to the ground.

In 1994 the first four hybrids were released (APHR-1, APHR-2, MGR-1 and KRH-1). By the end of 2001 a total of 18 hybrid varieties had been released across India². At least four of these – Sahyadri, PHB-71, PA-6201 and Hybrid-6444 – are presently being cultivated in Jharkhand and belong respectively to the multinational corporations Syngenta, DuPont, and the latter two to ProAgro/Bayer Crop Science³. Hybrid seeds are characterised by their high cost and by the fact that their seeds are not viable so farmers have to buy seed for every planting.

When environmental conditions are suitable and enough water, fertiliser and pesticide available, hybrid seeds, at least in the short term give high yields – making them attractive to farmers who are often unable to produce enough rice to feed their families through the year. The Directorate of Rice Development (DRD)⁴, Government of India, states that hybrid rice has increased yields by 15-20% compared to HYVs⁵. Yet the DRD lists many constraints in hybrid rice cultivation, including: poor grain quality, high cost of seed, susceptibility to major pests and diseases, and a lack of extension

¹ <http://dacnet.nic.in/rice> (accessed September 2009)

² Rice in India – A Status Paper, 2002, <http://dacnet.nic.in/rice>

³ See Appendix A.

⁴ The Directorate of Rice Development is a subordinate office of the Ministry of Agriculture, Department of Agriculture and Cooperation, and functions from Patna, Bihar State.

⁵ Rice in India – A Status Paper, 2002, <http://dacnet.nic.in/rice>

activities to guide farmers about hybrid rice cultivation technology. Issues like the health and environmental impacts of chemical agriculture are not dealt with in government communiqués nor are larger issues pertaining to farmers' loss of control over their seeds and conversely the control of the seed by private companies.

Today it is difficult to gauge the number of hybrid varieties of rice that have been released in Jharkhand. Many players have entered the market and the monitoring and record keeping of the government is inadequate. There are few studies on the uptake of hybrid rice in Jharkhand and its impact. In order to get some idea of the dynamics of seed choice, the uptake of hybrid rice and the impact of this on farm economics. Gene Campaign undertook this study in Jharkhand.

Research Location

The study was conducted in 30 villages spread over three blocks in three districts of Jharkhand, namely Ranchi, Khunti and Lohardaga. The research included a quantitative and qualitative approach. 10 farmers per village were selected randomly for the quantitative survey, making a sample size of 300 farmers. Apart from the quantitative survey, Focus Group Discussions were conducted with fourteen farmer groups and six progressive farmers were interviewed. Further, Focus Group Discussions were conducted with seed dealers in Ranchi, Khunti and Lohardaga and interviews were conducted with eleven seed dealers.

Field research was conducted from July to December 2009. A pilot survey was conducted before the main study in three villages each of three different blocks in Ranchi District. This was done to test the strength of the survey form and research approach.

The research study aimed to understand what seed farmers were selecting for rice cultivation, and why; their use of traditional HYV and hybrid seed and the impact this had on their mode of cultivation and farm economics. Jharkhand which is considered a Centre of Origin of rice has a very rich genetic diversity of rice which the introduction of hybrid rice is likely to impact negatively. Yet hybrid rice is promoted for its high yield in this largely poor, tribal region.

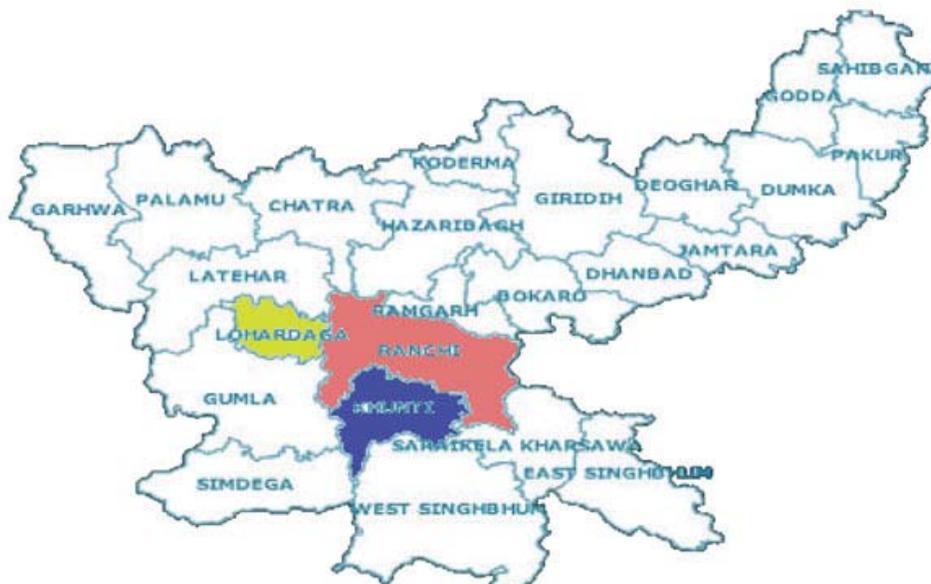
We tried to understand the reasons why farmers select certain seed, how hybrid rice has affected food availability and their perception about the impact of hybrid rice. Apart from the farmers, the perceptions and experiences of the seed dealers were also evaluated. Seed dealers are very influential

since they not only sell seed and agriculture inputs, they have also emerged as an important source of credit since banks are reluctant to lend to farmers who they consider high risk clients. The views of seed dealers is likely to influence farmer choice.

India, showing the selected research state- Jharkhand



Jharkhand State, showing the selected research districts



Basic data of the research area

Name of block	Adivasi (Tribal) population	Literacy Rate	Total area (hectares)	Forest cover (%)	Cultivated land (%)	No. of households	Cultivated land per hh (ha/hh)
Ormanjhi	35%	46%	22,817	27	55	13525	0.93
Karra	72%	40%	50,742	13	66	16861	1.99
Kuru	49%	42%	26,768	16	42	15028	0.75

Ormanjhi Block, Ranchi District

Ormanjhi, connected to the state capital Ranchi by National Highway 33, has a population (2005) of 76,158 persons living in 13,525 households. Of this population, 35% are Adivasis (Tribes) and 4% Scheduled Castes, the remainder being general castes. The literacy rate is 46%. The total area of Ormanjhi Block is 22,817 hectares of which 27% is forest, 55% arable land, 4% cultivable wasteland, and 14% uncultivable wasteland. Of the 12,524 hectares cultivated agricultural land, the government statistics claim 25% to be irrigated but in reality, irrigation cover is much lower.

Karra Block, Khunti District

Karra Block is located in Khunti district to the south-west of Ranchi. According to the Intermediate Census, 2005 the block's population is 90,836 persons living in 16,861 households, of which 72% are Adivasis (Tribes) and 4% Scheduled Castes, the remainder being general castes. The literacy rate, 40%, is lower than Ormanjhi. The total area of Karra Block is 50,742, of which 13% is forest, 66% cultivated agricultural land, 9% cultivable wasteland and 12% uncultivable wasteland. Of the 33,482 hectares cultivated agricultural land, the government statistics claim 20% to be irrigated but the reality is different.

Kuru Block, Lohardaga District

Kuru Block is located on the main road which links Garhwa, Palamau and Latehar Districts with Ranchi. It has a population (2005) of 83,922 persons living in 15,028 households. Of this population 49% are Adivasis, 5% Scheduled Castes, and the remainder general castes. The literacy rate is 42%. The total area of Kuru Block is 26,768 hectares of which 16% is forest, 42% cultivated agricultural land, 13% cultivable wasteland, and 29% uncultivable wasteland. Of the 11,211 hectares cultivated agricultural land, the government statistics claim 12% to be irrigated.

The age of farmers studied ranged from 20 to 70, but over 70 % of the farmers studied were between 30 to 45 years of age. Over one third of the farmers in the study area were illiterate and about 20 percent had received three years of schooling. 2.5 percent had a graduate degree, the rest had a middle school to high school education. Caste is an important social determinant in rural India. In Jharkhand, a largely tribal area, 56 percent of the farmers studied were tribal people. More than 50 % of the farmers had a household size ranging from 4 to 70. The farm size ranged from 0.10 acre to 20 acres.

Education level of the respondents

Education Level	Percentage
Illiterate	33.3
Primary	17.9
Middle	22.2
Matric	15.4
Intermediate	7.4
Graduate	3.7

Farmer Response

Has hybrid rice improved your economic condition

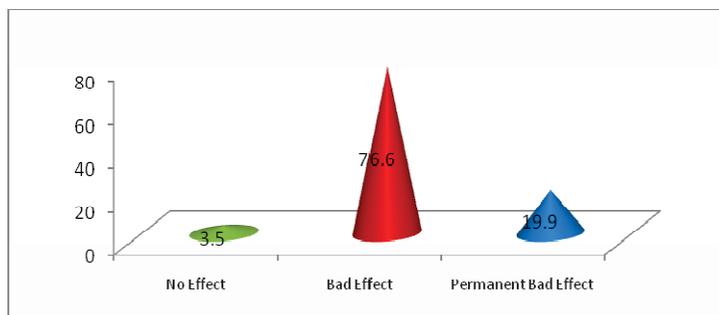
	%
Yes	57.5
No	42.5
Total	100



Despite the adoption of hybrid rice which is promoted as very high yielding, farmer responses are almost equally divided on whether their economic situation has improved. The percentage of farmers who say it has (57.5 percent) are not much more than the 42.5 percent who say their economic situation has not improved after adopting hybrid rice.

What will be the impact of hybrid rice on your soil

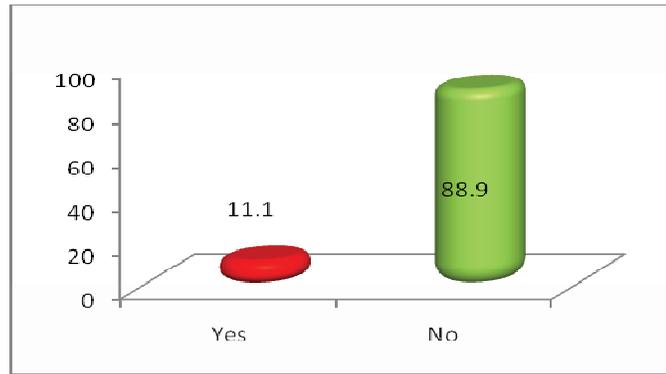
	%
No Effect	3.5
Bad Effect	76.6
Permanent Bad Effect	19.9
Total	100



Most farmers felt that the use of hybrid rice was deleterious for soil health in the long run. Almost twenty percent were of the view that the damage to the soil would be permanent. Despite this many farmers opt for hybrid rice because of the promise of high yield. Its like playing the lottery. Even though you realise that chances of failure are high, you keep hoping that the one big win will make you rich. Farmers hope that the promised high yield will bring more food for their families and they take into account long term damage since the need for food is immediate.

Have food habits in the family changed after growing hybrid rice

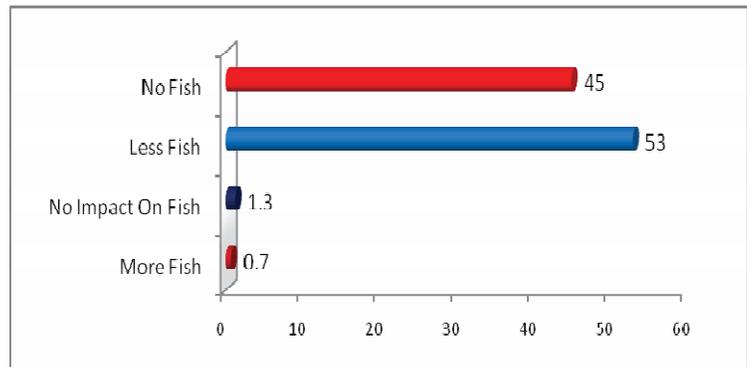
	%
Yes	11.1
No	88.9
Total	100



Reflecting the percentage for traditional rice for food and the fact that hybrid rice is cultivated for the market, not for domestic use, farmers overwhelmingly noted that the food habits of the family had not change after they switched to the cultivation of hybrid rice. Neither did the hybrid rice cultivation generate sufficient surpluses cash, for it to have made any significant difference to their diets, by either diversifying it or making it more nutritious.

What is the impact of hybrid rice on fish in paddy fields

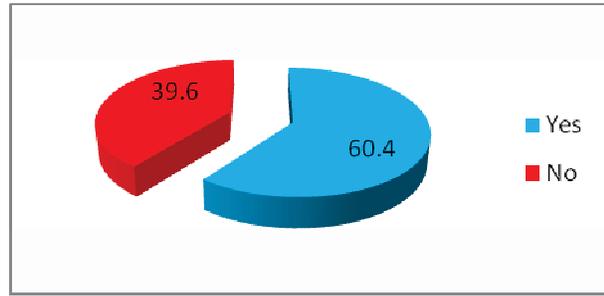
	%
More Fish	0.7
No Impact On Fish	1.3
Less Fish	53
No Fish	45
Total	100



Almost all farmers (98%) reported the loss of supplementary food sources like fish. Fish in the paddy field has been a traditional protein bonus for rice farmers, across Asia. With the use of hybrid rice and the chemical inputs needed for its cultivation, the protein bonus coming from fish, as well as crabs and snails in the fields has either diminished drastically or disappeared altogether.

Is pesticide cost higher for hybrids

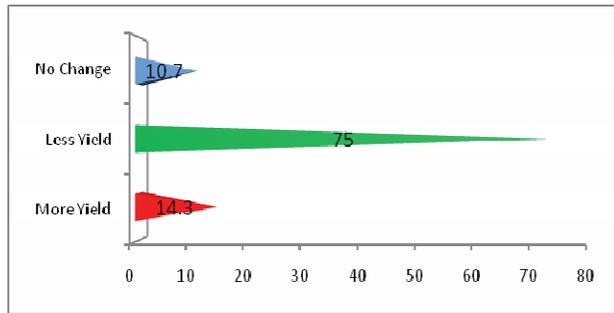
	%
Yes	60.4
No	39.6
Total	100



Hybrid rice is very prone to disease and requires heavy investment in both fertiliser and pesticide.

What will be the long term impact of hybrid rice on yield

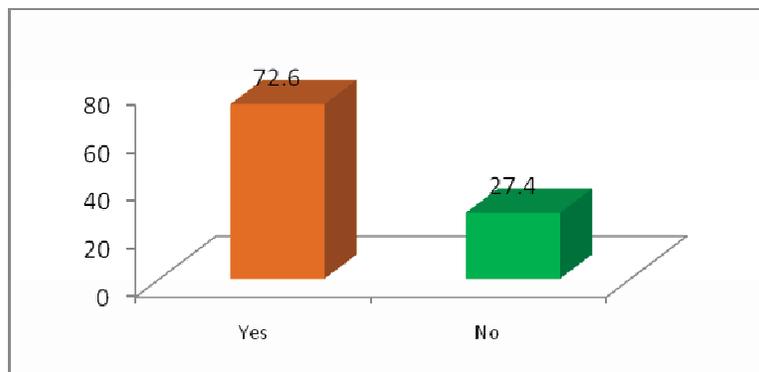
	%
More Yield	14.3
Less Yield	75
No Change	10.7
Total	100



Along with their apprehensions about soil health, farmers feel that their land will not continue to give high yields from hybrid seed. Seventy five percent of farmers anticipated that in time, hybrid seeds will yield less. This also reflects the highly uneven performance of hybrid rice in Jharkhand. Some times farmers can get good yields but often the hybrid rice has failed completely. Farmers realise the higher cost of inputs, specially on pesticides.

Farmers growing traditional rice in village

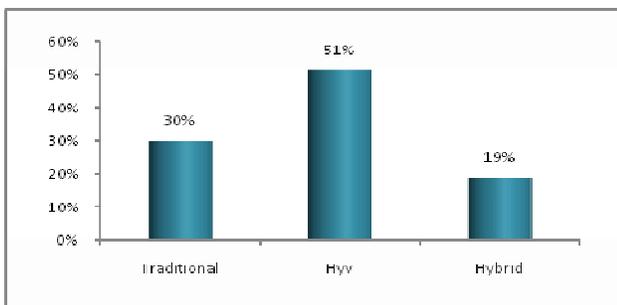
	%
Yes	72.6
No	27.4
Total	100



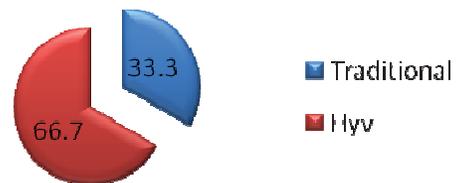
Despite the growing adoption of hybrid rice, roughly three fourths of farmers still cultivate traditional rice today. Part of the reason is that traditional rice has been revived and because its seed is available from Gene Campaign's Seed Banks.

Hybrid seed in vegetables are used more successfully than in rice but their high cost is a restraint to wider uptake by farmers. The cultivation of wheat is done with traditional and HYV seeds. Wheat hybrids are not yet on the market and hybrids of oilseeds are not prevalent either.

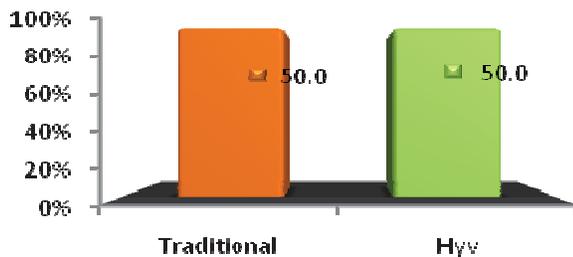
Seeds type in vegetable cultivation



Seed type in wheat cultivation



Seed type in oilseed cultivation





Researcher interviewing farmers

Quality of hybrid rice, and the effects of chemical agriculture

When discussing the nutritional value of the different types of rice, three categories of responses were most common. The first set included that local rice varieties taste sweet and conversely hybrid rice varieties had little or no taste, and are therefore not good to eat. High yielding varieties' taste was generally approved of by farmers. Several times it was mentioned that when hybrid rice is eaten, vegetables are craved for. If people eat local varieties of rice, they say they have no need for vegetables – the rice is so tasty and nutritious! This is because it contains more vitamins and no chemical pesticides are added. In this same argument, some farmers claimed that because of eating hybrid rice, illness rates are increasing. Hybrid rice apparently digests too fast, which farmers felt was at least partly because of the pesticide applied to the crop. Farmers also claimed they need to eat twice rather than once in a day, if eating hybrid rice. It was also said that hybrid rice does not give enough strength needed for hard labour.

The second set of responses revolved around the preparation of the rice. Basically, the point is that hybrid, when cooked, cannot be kept for very long. If prepared in the morning, by the same evening it

is unpalatable. Conversely local rice can be cooked one day, and eaten the next – some people go as far as saying it can be kept for four to five days and then consumed. Rice beer, a cultural necessity for adivasis at the time of rituals and festivals, is made by brewing rice for several days – and adivasi farmers said that hybrid rice is not good for brewing beer.



Hybrid Rice

The third set of responses to the question of hybrid's nutritional qualities related to the question only indirectly. There are storage issues with hybrid rice. Traditionally farmers store their rice in baskets made of ropes by placing it in a large bamboo container, and by placing this storage container within their homes on a raised platform or in their roof. The paddy keeps easily for one year, and apparently for up to four years. This technique has been practised for centuries, and the farming communities know no alternative. With the introduction of hybrid rice they now face problems, for hybrid rice stored in this way only keeps for one year or less. Catterpillars infests the rice, and destroy it. Some farmers said that although they get a higher yield with hybrid rice, they have to sell the rice quickly, because it does not keep well. This means that farmers saving hybrid rice for the home must consume it within a year, and whatever is left must be sold. This has implications for household food security, because traditionally farmers were able to store their rice for long periods, especially to help them through drought periods.

Farmers were undecided and gave conflicting views as to whether hybrid rice cultivation uses more or the same amounts of chemical fertiliser as compared to HYVs. Some claimed hybrid needs much more fertiliser, while others claimed hybrid requires the same amounts as HYVs. They all agreed that local varieties do not need fertiliser, and that giving fertiliser can cause the plants to grow too tall, leading them to fall over. They also all agreed that without chemical fertiliser, hybrid cannot be grown. Most farmers expressed their concern as to the damage chemical inputs inflict upon their soil. One thought that it would take just five years for his soil to be damaged such that it would become unproductive. Another said that it would be okay for three years, but that after six or seven years the chemicals would damage the soil permanently.

When asked if they have noticed differences in fish populations in paddy fields and rivers, one farmer stated that fish found in paddy fields used to be eight inches in length, but that now they were a mere two or three inches. This was in Ormanjhi, close to the Birsa Agricultural University and in a location where hybrids have been used extensively for quite some time. By contrast several farmers in Karra Block, where chemical agriculture is more recent and less practised, said that they had noticed no difference. Yet a few farmers did say they had noticed a decline in the fish population. Finally, one Kuru-based farmer, where hybrids and inputs are widely used, estimated that the fish population has been reduced to a quarter of what it was.

Impact of hybrid rice uptake

Farmers are aware that introduction of hybrid rice will lead to the loss of traditional varieties. They describe maturing how the early upland rice varieties, critical for bridging hunger during the critical months before the main rice crop is harvested, are disappearing. This rice harvested in September before the main rice crop and at a time when household grain stores are typically exhausted, provides in many cases, the only source of food. If the planting of these rice varieties ceases, there will be problems of growing hunger. Such rice varieties and millets both grown on upland.

Farmers mentioned that the promise of high yield lures them to adopt hybrid rice, but they prefer the taste of traditional rice. They said that the government was doing nothing to save traditional varieties, but Gene Campaign had been working to save these important varieties. Gene Campaign's Seed Banks are greatly appreciated as a seed source of traditional varieties. Farmers mentioned they are able to cultivate traditional rice of their choice and suited to their land type, thanks to the Seed banks of Gene Campaign.

Rice cultivation today and five years ago

This study also tried to assess the varieties that farmers use today and what they used five years ago for cultivation of rice. Five years ago 87% of the farmers used traditional seed and the rest used HYV. Today only 32% farmers are using traditional seeds. 22 percent have switched to HYV and about 37 percent to hybrid rice.

Seed choice today and five years ago

Seed Type	Current	5 year ago
Traditional	32.0%	87.0%
HYV	22.0%	10.1%
Hybrid	36.7%	2.9%
Traditional and HYV	2.0%	
Traditional and Hybrid	4.7%	
HYV and Hybrid	1.3%	
Traditional and HYV and Hybrid	1.3%	



Traditional Rice Varieties

Changing seed type has also meant a change in the source of the seed. Five years ago, nearly 75% of the farmers planted their rice with the seeds they had saved from their own cultivation. Today this percentage has declined to 34 percent, reflecting the use of hybrid seeds. With the use of hybrid seed farmers are not able to save seed for next year's cultivation so they have to purchase the seed every year, making them dependent on the seed company. 57 percent farmers today buy seed as compared to 15 percent five years ago.

Seed source today and five years ago

Seed source	Current	5 year before
Own farm	34.0%	75.2%
Village	9.2%	10.1%
Seed Dealer	56.9%	14.7%

Meeting the cost of cultivation

Today, like five year ago, majority of farmers rely on their own resources to pay for cultivation costs. Loans from banks were not forthcoming five years ago, they are still not accessible. Due to a decline in their financial position, family members today are less in a position to loan money to meet cultivation costs, than was the case five years ago. Lack of access to financial resources limits productivity since farmers cannot afford to buy fertilisers, and where available, water.

Source of finances

Source	Currently	5 year before
Self	65.8	58.1
Borrow from family	25.5	33.8
Bank Loan	2.7	1.4
Money lender	6.0	6.8

Rice store for the family

The number of farmers having rice stores lasting more than 12 month has increased from about 10 percent five years ago to nearly 19 percent today. There are the larger farmers usually. Also the farming families that have rice stores of having rice less than 3 month for their own consumption has declined from 16.1% to 7.6%.

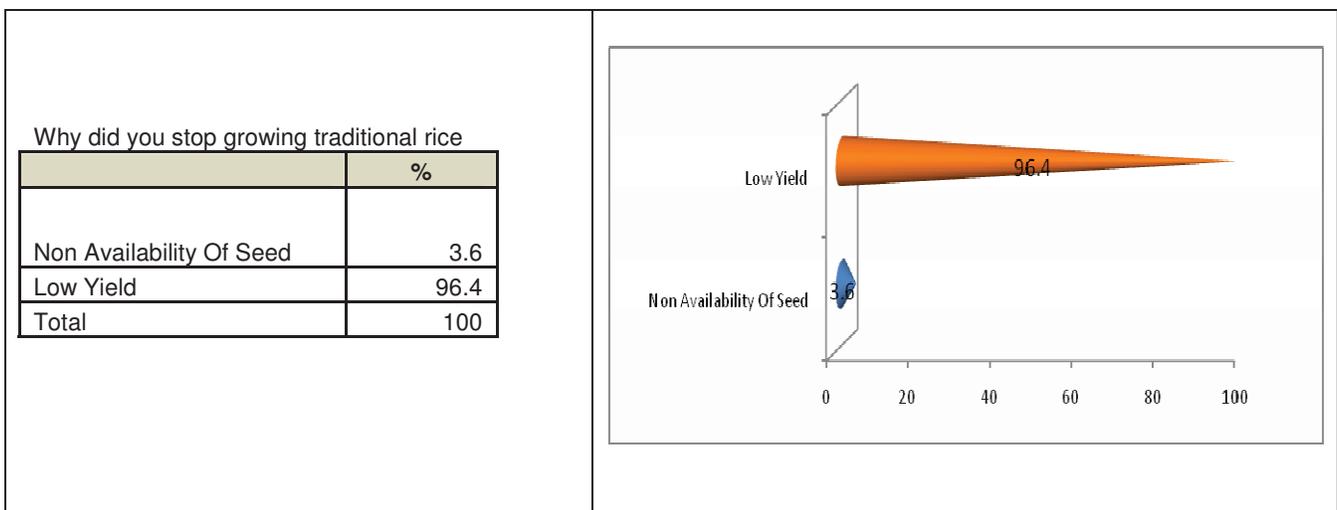
Rice store for domestic consumption

No. of Months	Currently	5 year before
> 12	19.1%	9.7%
9-12	26.8%	23.2%
6-9	22.3%	23.9%
3-6	24.2%	27.1%
< 3	7.6%	16.1%

Farmers adopt hybrid rice because the higher yield gives them more rice for home use and alleviates hunger. However they do not like its taste and are conscious that they lose supplementary food sources like fish, crabs and snails from rice fields. They also feel that hybrid rice is “not good” for their health. 70 percent of the farmers surveyed said that traditional rice makes them strong, as compared to 10 percent who felt that hybrid rice was also good.

Farmers overwhelmingly felt that the use of hybrid seed will ultimately lead to the degradation of their land and that the use of pesticides is harmful for the health. They felt that the continuous use of hybrid seed will lead to decline in yield.

When farmers who use hybrid seeds were asked why they have stopped using traditional seeds for cultivation majority of them (96%) cited the low yield as the main reason, and nearly 3% cited non availability of traditional seed as the reason for their discontinuation of traditional seeds. Most farmers say they get higher yield with hybrids although this is not always borne out by the data on yield.



Although farmers want to experiment with hybrid rice to see if they can get the high yield promised, they would like to cultivate traditional rice for home consumption. The great variety of traditional varieties are suited to a range of agronomic situations giving (especially) marginal farmers greater security than the 'all or nothing' performance of hybrid rice which can give high yields but also fail completely. Farmers also prefer the taste of traditional rice which gives a sated feeling for a longer period, thus keeping the stomach "full" for longer and keeping hunger at bay. Many farmers moved to hybrid rice since the seed of traditional rice was not available. However this trend is changing after Gene Campaign's Seed Banks are providing seed of traditional rice varieties. Although Gene Campaign can not meet the burgeoning demand yet, we expect to scale up to provide more seed to a larger number of farmers in the coming years.

Despite the aggressive promotion by private companies and the fact that seed of traditional varieties is difficult to get, many farmers still do not cultivate hybrid rice. Cost of cultivation is certainly one factor. The seed is expensive and hybrid rice cultivation requires assured water (difficult to guarantee under rainfed conditions), heavy use of fertilizers and pesticides to control pests to which hybrids are particularly prone.

Farmers do not like the taste of hybrid rice so if there is a small holding, enough to grow rice just for domestic use, the farmer will plant traditional rice. Traditional varieties are locally adapted and can provide a decent (if not large) harvest even without heavy inputs of fertilizers. Traditional varieties are usually resistant to pests so there is little or no investment required in pesticides. Traditional varieties, specially when planted as a mixture of varieties are much better able to distribute risk under adverse conditions. This suits small farmers having poor quality land much better than hybrid rice. Larger farmers better able to take risk usually grow hybrid rice, for the cash income. A poor harvest does not set them back in the way it does small farmers.

Farmers said that in the past they had cultivated only traditional rice varieties using, the broadcast method to sow the seeds, and had used no chemical fertiliser or pesticide. Some farmers said that by the early 1990s they began using urea to cultivate traditional varieties. High yielding varieties like IR36 and IR 64 were introduced by around 1997-98 followed immediately by the introduction of hybrid rice. The transplantation technique was introduced with HYVs. Farmers said that for hybrid rice cultivation

transplantation must be done on time and, they had to use chemical fertiliser and pesticide, thus increasing risk, labour, and input cost. Today both transplantation and broadcasting are used to cultivate rice. Broadcasting (direct seeding) is done almost always on upland fields and transplantation on the lower fields.



Assessing farmers' views on rice cultivation

The new technique of SRI, or System of Rice Intensification is being promoted by groups like Gene Campaign and others, to increase the yield of traditional rice. Labour to work in the fields, specially at transplantation time is becoming difficult partly because of growing urban migration but also because of the government's rural employment guarantee scheme which provides 100 days of guaranteed employment to rural people to create infrastructure like water tanks and village roads. One of the impacts of labour shortage is seen in areas where arable land (especially upland fields) are being left fallow, even during the rice season.

Farmers' experiences with hybrid rice (FGD)

Farmers described a range of experiences with hybrid rice. Many lost part or all of their crops due to germination failure, failure to set seed and high susceptibility to diseases like blast and gall midge. Other farmers, able to afford agrochemicals were able to buy the more expensive seed, apply sufficient fertiliser and pesticide in large quantities to control disease.

When small farmers can afford to invest in all the inputs required for hybrid rice cultivation and they have access to supplementary water to tide over breaks in the rainfall, they can grow hybrid rice successfully. Large farmers are also able to access hybrid and HYV seeds from reliable sources which small farmers are unable to do, falling victim to fly-by-night operators who sell them spurious or old seeds. Big farmers therefore have a better experience with hybrid rice than resource poor, small and usually illiterate farmers who are unable to access correct information. Small farmers have sometimes lost their crops because they replanted hybrid seeds. Nobody had told them that hybrid seeds can not be saved to plant the next crops. Hybrid rice needs a great deal of investment, access to correct information and timely interventions during cultivation. Small farmers are often not able to satisfy these conditions and after spending money on expensive seed, can lose their entire crop. If the farmer falls ill, there is no help and if he is unable to tend to the hybrid crop in the correct way, he stands to lose the entire crop. This does not happen with traditional rice which is hardy and well adapted to local conditions including scarce water almost always disease resistant.

The adoption of hybrid rice by farmers is varied. Villages closer to the bigger towns were exposed to hybrids early. Villages in interior areas were exposed to hybrids later. The experience with hybrid rice therefore ranges from two years to about 12 years. There is a prevailing perception that although hybrid rice gives a better yield under good conditions, it lacks the “strength” of traditional rice. This means that it does not strengthen the body the way that traditional rice does. The hybrid rice does not enjoy the regard that traditional varieties do, but it provides more cash income to the bigger farmers who are in a position to take more risk.

Farmers and Seed Dealers

We asked farmers to explain how the seed dealers promote hybrid seeds, especially newly released varieties. Farmers felt that they were given correct information, for otherwise the dealer's business will suffer the following year. A few said that the shopkeeper will try to sell the seed that he can make the most profit on. Some farmers said that the dealers often give them the wrong seed because they do not know their land type. Farmers of upland, medium land and low land types require different kinds of seeds. Seed dealers may not know this.

Hybrid seed company agents seem to visit some villages but not others. Where they do visit, the farmers get to listen to agents and seek advice. The agents may provide training, and the companies may give gifts along with seed, or even free seed. Where agents do not visit, farmers are dependent upon shopkeepers' advice and on advertising. The seemingly large (and arguably unnecessary) number of new companies emerging in the hybrid seed market has thoroughly confused farmers – one farmer said *“our heads are spinning because there are so many companies and seeds!”* Farmers generally deal with this by going with the companies they know (the older ones), or by experimenting (in informal groups) with a new seed on a part of their land. For example, one farmer may grow a new variety while others watch and/or try out other new varieties. This way, they do not all need to risk trying the new varieties.



Upland, Medium land and Lowland rice fields require different varieties

Responses from Seed Dealers

Eleven seed dealers were interviewed for the study. On visiting these businesses, a majority of the seed dealers were slightly suspicious of our research activities, but once we had introduced our topic, they were thoroughly interested in having the opportunity to discuss the pros and cons of hybrids rice and were keen to express their concerns with the way the hybrid rice trade is unfolding.

The seed shops visited varied from a small unviable entrepreneurial endeavour on a country lane to a large distributor based at the heart of Jharkhand's hybrid trade in central Ranchi. Most of the shops not only sell hybrid rice but also specialise in the sale of the many varieties of hybrid vegetables. Jharkhand has a good production of vegetables due to its elevation and suitable climate. Seed dealers began selling hybrid rice seed in 1998-99. The hybrid rice sold in the earlier years was Pioneer (PHI Seeds Ltd), Arize (Proagro Seed Company Private Ltd), Advanta (Advanta India Ltd), and Suruchi (Mahyco Seeds Ltd). The hybrid rice trade in Jharkhand was pioneered by foreign companies: PHI Seeds is owned by DuPont, USA; Proagro Seed Co is a subsidiary of Bayer Crop Science, Germany; Advanta was owned by a Dutch company until 2006, and is now owned by United Phosphorus Limited India; Mahyco Seeds Ltd is an Indian seed company of which Monsanto USA owns 26 %. At present, there are 30-40 rice hybrids available in Jharkhand..



Advertising hybrid seeds – six different companies' seeds are visible

Hybrid rice sale in 2008 and 2009

We studied the sale of hybrid rice and HYV varieties in 2008 and 2009. In 2009 the rains were delayed and deficient. As a result, farmers bought less hybrid seed and more HYV, as compared to 2008. High yielding varieties (HYVs), were distributed in large quantities in 2009 by the Government of Jharkhand under a government supported programme to support agriculture production.

Data on Hybrid and HYV sales in 2009 and 2008

No.	Location	Hybrid sales (tonnes)			HYV sales (tonnes)		
		2009	2008	Change	2009	2008	Change
1	Ormanjhi	6	11	↓	20	5	↑
2	Ormanjhi	-	-	-	-	-	-
3	Ormanjhi	6	12	↓	50	20	↑
4	Ormanjhi	2	3.5	↓	10	10.5	↔
5	Ormanjhi	0.15	0.2	↓	9	6	↑
6	Karra	-	-	-	-	-	-
7	Karra	Less	More	↓	More	Less	↑
8	Karra	6	10	↓	9	6	↑
9	Karra	2	5	↓	9	5	↑
10	Kuru	15	30	↓	40	50	↓
11	Ranchi	35	35	↔	220	450	↓

The data shows that due to the delayed monsoon, farmers were reluctant to plant expensive & high risk hybrid rice. Sales of hybrid rice were down in all regions where farmers preferred the more reliable and cheaper HYV. The further increase in prices of the already expensive hybrid rice seed from Rs. 180/-kg in 2008 to Rs. 210/-kg in 2009 made it even less attractive to farmers.

The hybrid rice seeds of around 27 companies were found to be sold in the research areas. See below.

Company name	Origin of company	Website	Information on website of seeds sold
Advanta India Ltd, UPL	Utd Phosphorus Limited, Indian	www.advantaindia.com (Advanta was owned by Dutch company until 2006)	<u>Advanta 832, 801, 807 + others</u>
Atash Seeds Pvt Ltd Avesthagen	Indian, Limagrain Group	atashseeds.com/ (Under construction) www.avesthagen.com/atash.htm	<u>SRH 1 and SRH 302</u>
Delta Agrigenet's Pvt Ltd / Victory	Indian	No Website (Formed by break-away scientists??)	No info: <u>Ashay, Resma, Shanti, Sudhar</u>
Dhaanya Seeds Ltd	Indian	www.dhaanya.com	<u>Dhaanya 775 and 748</u>
Euro Seed	Indian	No Website	No information: <u>Euro</u>

			<u>09, 27, 54</u>
Ganga Kaveri Seeds Pvt Ltd	Indian	No Website	No information
GEO Biotech's India Pvt Ltd	India (links with Profarm)	http://geoseeds.org/products_rice.html (Profarm seeds is a US company)	<u>GEO Crystal</u> , links with <u>Victory Marvel</u>
Indo Gulf / Aditya Birla NUVO	Indian	www.adityabirlanuvo.com/indogulf/	No info: <u>115, 120, 125+</u> or on 125 & 135
JK Agrigenetics Ltd	Indian	jkseeds.net/	JK 401 , No info: <u>1220</u>
Kaveri Seed Co Pvt Ltd	Indian	http://www.kaveriseeds.in/home.html	Kaveri 9090, Gold,
Krishidhan	Indian	www.krishidhanseeds.com	<u>810</u> & Komal but no info: <u>Prem 9999</u>
Mahyco Seeds Ltd	Monsanto, USA	www.mahyco.com	Mentions Suruchi 5629
Manisha Agri Biotech Pvt Ltd	Indian	http://manishabiotech.com Under construction	No info: <u>Tara, Chandni, Pritvi, Suraj</u>
Monsanto India Ltd (Devgen)	Indian/Monsanto, USA	www.monsantoindia.com www.devgen.com	Frontline RH-257 and RH-664
Namdhari Seeds Pvt Ltd	Indian	www.namdhariseeds.com/	No info: KRH
Nath Biogene (I) Ltd	Indian	http://www.nathseeds.com	Nath 508, 509, 510 + others
Nirmal Seeds Pvt Ltd	Indian	www.nirmalseedsindia.com	44, 48 & 57 but no info: <u>89</u>
Nuziveedu Seeds Ltd	Indian	www.nuziveeduseeds.com	<u>NPH207 Champion, NPH369 Raja</u> +others
PHI Seeds Ltd	DuPont, USA	www.pioneer.com/india/	Pioneer PHB71, 25P25 +others
Proagro Seed Co Pvt Ltd	Bayer Crop Sci., Germany	www.bayercropscience.com	Arize 6444, 6129 + others
Seed Works India Pvt Ltd	US Agriseeds, USA	http://seedworksindia.com/	US 312,316,328 , and US311 and 383
Shakti Seeds Pvt Ltd	Indian	No Website	No info: <u>Goldie, SRH5151, SRH5152</u>
Sona Genetics Pvt Ltd	Indian?	No Website	No info: <u>405, 444</u>
Syngenta India Ltd	Syngenta, Switzerland	www.syngenta.co.in	<u>Sahyadri, 5251</u> + others. No info: <u>3525</u>
Vibha AgroTec Ltd (and NGRL)	Indian	www.vibhaseeds.com . Nusun Genetic Research Ltd (NGRL) has no website	No info: <u>VRH 602</u> , or NuSun's <u>Marvel</u>
VNR Seeds Private Ltd	Indian	www.vnrseeds.com	<u>2245, 2115</u> (this is 2111?), <u>2355</u> + others
Zuari Seeds Ltd, KK Birla Group	Indian	No website Zuari Industries	No info: Zuari 6606

Note: Underlined seeds, in column four, are hybrid seeds we found being sold in Jharkhand

The larger seed dealers source their hybrid seeds from several distributors depending on the demand from farmers, promotion by government agriculture officials and most of all, on the commission they get from the company. Smaller shops usually source their seeds from larger dealers located in their area. The dealers sell to farmers directly but also supply as many as 30 smaller shops nearby. One distributor in Kuru Block dealt directly with seven hybrid companies: Mahyco, Advanta, Pioneer, JK

Seeds, Dhaanya, Krishidhan and Indo-Gulf Fertilisers. He is not interested to compete with other seed shops to sell to farmers, instead he supplies seeds to shops in towns further in the interior.

Most popular hybrid rice varieties according to seed dealers:

- Pioneer PHB71 (PHI Seeds), DuPont, USA
- Advanta 832, 801, 807 (Advanta), United Phosphorus Ltd, India
- Arize 6444, 6129 and others (Proagro), Bayer Crop Science, Germany
- Frontline RH 257 and RH 664 (Devgen), Monsanto, USA
- US 312 and US 328 (Seed Works), US Agriseeds, USA
- Sahyadri (Syngenta), Syngenta, Switzerland
- (SRH 1 and SRH 302 (Atash), Limagrain Group, France)
- Suruchi 5629 Mahyco Seeds, India

The first three are the biggest sellers. More recently several other varieties of hybrid rice have entered the market, and some of these are best sellers in certain pockets:

- JK 410 and JK 1220, JK Seeds, India
- Manisha varieties, Manisha Agribiotech, India
- Zuari 6606, Zuari Seeds, India
- 508 Kabeer and 509 Goraknath, Nath Biogene, India
- SRH 5151 and SRH 5152, Shakti Seeds, India
- Prem 9999 and 810, Krishidhan, India
- Shaktiman 115, 120 and 125+, Indo-Gulf Fertilisers, India
- Dhaanya 775 and 748, Dhaanya Seeds, India

Seed dealers reported that the following hybrids had failed, causing losses to farmers. These losses were not made up by the companies.

- Pioneer 25P25 (PHI), DuPont, USA
- Arize 6201 (Proagro), Bayer Crop Science, Germany

The hybrid rice companies employ local agents, who visit the shopkeepers frequently. In late July and early August such agents are seen at seed shops to collect their company's unsold seed packets. The companies then send the seeds to other states for distribution – for example to Maharashtra or to

Chennai. The agent's job is to convince both seed sellers and farmers to use their company's products. They are usually given training in what messages to convey. In villages, the agent may give five or so farmers 2kg of seed, to sow demonstration plots to convince other villagers of their hybrid. The agent monitors these demo plots to ensure good performance. The results that farmers get seldom matches the performance of the demo plots but they are told it is their fault for not getting good yield. The reason for the difference are to be found in the fact that most farmers cannot afford adequate fertiliser to get a good yield.

Several of the seed dealers cultivate hybrid rice and also go to the field to monitor the performance of hybrids they are stocking for the first time. Large dealers prefer to stock seeds of 'branded' companies, such as Pioneer and Advanta. They are wary of the smaller companies since their seed often fails and they have to face the farmers' ire. They usually do not replace seed when the seed fails so the farmer carries the burden of poor quality seed supplied by the companies.

Hybrid seed packets normally carry information in English which even the seed dealers usually do not know. Farmers and dealers have no way of verifying for themselves, the properties, the company says the seed has. Farmer are thus forced to make choices merely on the basis of what the agent or the dealer says. They have no independent access to information to help them evaluate the seed.

The seed dealer usually makes bookings for hybrid seed in January by paying Rs. 20-35 per kg to the companies. By mid-June, when he knows the actual quantity of seed he'll need, he confirms these orders. By doing so, he can earn an extra Rs.5 per kg on the seed he sells.

Seed commissions

Seed dealers said that companies gave different commissions to sell their seed. Some were more generous than others. According to them Pioneer gave the highest commission and Mahyco the lowest, with the rest somewhere in between. One shopkeeper informed that he receives a commission of Rs.5-7/kg of hybrid seed sold. Another stated that he receives 5% to 10% of the price of the seed. If he sells one kg for Rs.210, he will receive ~Rs10-20/kg after paying the company. He further said that if he sells the seed on to a smaller dealer, then after the money is paid to the company, he will receive a 10% commission of which half will go to the smaller seed seller, and half he will keep.

None of the seed dealers interviewed said they had ever suffered losses in the hybrid seed trade. Some said they had some times had losses when dealing with HYV seeds, or they earned lower margins. The hybrid seed trade appears to be well organised. The seeds are highly priced, the dealer gets a good commission, the agents are paid to promote the seed. Farmers can benefit when yields are good. If however the seed fails, there is no compensation paid by the company and even the seed is not replaced. Dealers do not give receipts when they sell seed. Farmers are not aware about the importance of getting a receipt as proof of sale. When they do ask for a receipt, the dealer refuses to give one.

Seed dealers said none of the companies provide any training or trouble shooting either to them or to the farmers. They promote the seed as high yielding, saying it will yield three times more than traditional varieties. Companies also give small gifts to dealers and farmers.

Pioneer provides the most expensive of all hybrids and offers different gifts and incentives, for example;

- 2007, buy 6kg Pioneer and get an umbrella
- 2008, buy 6kg and find inside a silver or gold plated coin
- 2009, a 6kg bag of Pioneer given free to one farmer along with a book of 50 coupons, for him to give to other farmers; each coupon allows the purchase of 6kg Pioneer for a discounted price.



DuPont and Monsanto advertising their hybrid products in rural Jharkhand

Although hybrid rice companies claim their seed gives bumper yield, according to dealers, the yield difference between hybrid and traditional varieties is more modest. Traditional varieties according to them would yield 1.2-1.6 qt./ha and hybrid seed would yield from 2.0-2.4 qt/ha. Most dealers are not really aware about high yielding varieties (HYV). Seed of HYV is not readily available and therefore dealers do not stock it too much. Farmers also have limited exposure to HYV barring a few like IR 36 and IR 64. In Jharkhand, the two choices for rice seem to be traditional varieties and hybrids. HYV which are a very good option and much better suited to dryland conditions, do not play a significant role. The reason is apathetic government policy and an aggressive promotion of hybrid rice by private companies, backed with tacit support from the agriculture university and the state's agriculture department.

Pioneer appears to be the most flamboyant company in its advertising campaigns, both at seed shops and on the roadsides. The picture below shows a typical seed shop in 2009, bearing the flags of Pioneer, as well as a fancy chart showing graphically the methods for sowing Pioneer and the different varieties of hybrid rice the company offers. Promotional posters nailed to trees can be seen for kilometres along main roads. Despite the heavy promotion and backing by agriculture department officials, the offtake of the Pioneer seed is limited due to the high price. Farmers hooked to the message of high yield from hybrids often end up buying seed from little known companies when they cannot afford to buy expensive hybrids from Pioneer and end up suffering losses.

A typical seed shop stocking mainly hybrid seeds



Of all the hybrid rice companies, Pioneer, owned by DuPont, USA, is most flamboyant in its advertising

The seed dealers were asked for the reasons they believe motivate farmers to choose hybrid rice. The most frequent reasons that seed dealers gave for farmers choosing to cultivate hybrid rice were: 1. promise of higher yield, 2. Hope for surplus cash for expenditure, 3. small land holding not yielding enough. On the other hand, the most frequently mentioned reasons given for farmers not cultivating hybrid rice were: poor taste of rice, lack of cash/credit to buy seed, availability of HYV seed which performs well, and sufficient land to produce a good yield.

The seed dealers were of the opinion, that traditional varieties will be cultivated only for another 10-20 years, until the older generation of farmers retire from farming. After that, according to them, only hybrid rice will be cultivated. Farmers did not share this view.

Both farmers and seed dealers are of the view that hybrid rice is less nutritious than local rice varieties. According to them hybrid rice when cooked does not keep until the evening as compared to traditional rice which remains edible for two days or more. Farmers say that the quality of hybrid rice is not good and it is cultivated for the market, not for home use. Seed dealers had not considered the future implications of what will happen if all seeds were owned by private companies. They said they would sell the seed of all companies that gave them commissions. It was not their responsibility to judge the merits /demerits of private seed companies, and their control of the seed sector. That was the job of the government.

Appendix- Lists of seeds

Local varieties or landraces found during field research

S. No.	Traditional name
1	Aginsal (Agnisal)
2	Alamsai
3	Bachcha Kalamdani
4	Baghpanjar
5	Bala Gora
6	Bankar
7	Bara Dhusri
8	Bara Sal
9	Barka Kalamdani
10	Bhanjani
11	Bhojni / Bhojna
12	Bhudhko (mota)
13	Bhunki Dhan
14	Budha Dhan
15	Bodhi Sal
16	Budnu
17	Bush Kalika
18	Chaki Rais
19	Charka Dhan
20	Chawra
21	Chaina Gora
22	Chora Lal Dhan
23	Dahiya
24	Danrbako
25	Danto
26	Dhaniyaful / Daniya
27	Dhusri
28	Dudha Rais
29	Dudha Sair
30	Dudh Kandar
31	Dupliya Dhan
32	Duku
33	Gajpatti
34	Garib Sal
35	Gora
36	Gundali
37	Haldisal (Hardi Sail)
38	Halka Dhan
39	Hardi Muri
40	Harekuta

S. No.	Traditional name
41	Hathipanja
42	Jhinga
43	Jhingaphool
44	Jhingasal
45	Jhunna
46	Jonga
47	Kalamdani
48	Kala Mehiya
49	Kala Nanhiya
50	Kanow
51	Kapursail
52	Karangi
53	Karhaini
54	Ketka (Katika)
55	Khira Bhojna (Manji)
56	Kohdaful
57	Lakhansal
58	Lal Dhan
59	Lamba Asari
60	Mehiya
61	Mota Nanhiya
62	Nadi Tikur
63	Nanka Bhojni
64	Nanhiya
65	Neta
66	Panch Phor (Phood)
67	Pani Sair (Sal)
68	Prasad Bhog
69	Raghi
70	Rais
71	Rajasal
72	Ramji (Ramjira?)
73	Rangi (Lal Dhan 2)
74	Rani Kajar
75	Ratgoli
76	Safed Dhan
77	Sambal Puriya
78	Sangal Puriya (same as 77?)
79	Sarai Kela
80	Sarai Phool (for tanr)

S. No.	Traditional name
81	Sathi Dhan
82	Somadi
83	Sonum
84	Sugathor
85	Tepun / Tepar

S. No.	Traditional name
86	Thosatamir
87	Tilasaar
88	Trigan (a hybrid?)
89	Tumbarhia (Tamariya)
89	TOTAL

Note: the names in brackets are possible spellings taken from a Gene Campaign list of local varieties, however spellings vary so much that it is difficult to know if these are separate varieties or not.

High yielding varieties found during field research

S. No.	Variety name
1	IR36
2	IR64
3	Jaya
4	Kanada
5	Lalat
6	Mansuri
7	Ratna
8	Sita
9	Sonali
10	Sonalika
11	Sonum
12	Surji/Sarya Bhavan
13	Taichun
13	TOTAL

Hybrid rice varieties found during field research

S. No.	Variety name
1	Advanta 832
2	Advanta 801
3	Advanta 807
4	Delta Victory Ashay
5	Delta Victory Resma
6	Delta Victory Shanti
7	Delta Victory Sudhar
8	Dhaanya 775
9	Dhaanya 748
10	Euro 09
11	Euro 27

S. No.	Variety name
12	Euro 54
13	Euro 63
14	Ganga Kaveri
15	Indo-gulf 115
16	Indo-gulf 120
17	Indo-gulf 125+
18	JK 401
19	JK 1220
20	Kaveri
21	Krishidhan 810
22	Krishidhan Prem 9999

S. No.	Variety name
23	Mahyco Suruchi 5629
24	Manisha Tara
25	Manisha Chandni (777)
26	Manisha Pritvi
27	Manisha Suraj (9)
28	Monsanto Frontline 257
29	Monsanto Frontline 664
30	Namdhari KRH
31	Nath 508 Kabeer
32	Nath 509 Goraknath
33	Nath 510 Loknath
34	Nirmal NR89 Kranti
35	Nuziveedu Champion
36	Nuziveedu Raja
37	PHI Pioneer PHB71
38	PHI Pioneer 25P25
39	Proagro Arize 6444

S. No.	Variety name
40	Proagro Arize 6129
41	Seed Works US 312
42	Seed Works US 316
43	Seed Works US 328
44	Shakti Goldie
45	Shakti SRH5151
46	Shakti SRH5152
47	Sona 405, Sona 444
48	Syngenta Sahyadri
49	Syngenta 5251
50	Syngenta 3525
51	VNR 2245
52	VNR 2115 (2111)
53	VNR 2355
54	Zuari 6606
55	TOTAL

Note: several other hybrids, as yet unidentified, were mentioned by farmers during the field work: Jaysri, Shankar, Radha Sankar, Okar, Wonder, Century and Ek lakh ek. Also, GEO Crystal, Vibha VRH 602, and Marvel (which may be Nusun or Pro farm seeds USA?)

