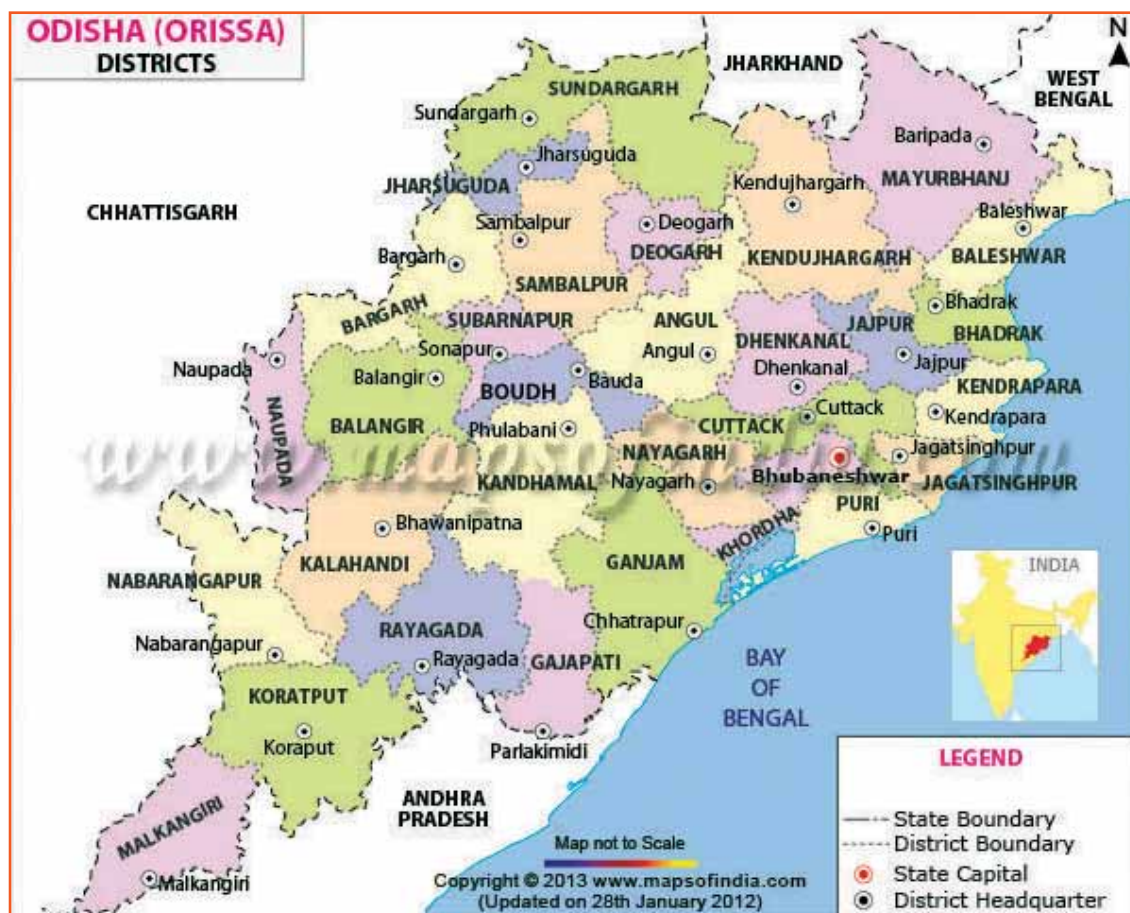




## Improved ICRISAT Pigeonpea Varieties and Hybrids for Odisha



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*All photographs: ICRISAT (unless otherwise stated).*



# Improved ICRISAT Pigeonpea Varieties and Hybrids for Odisha

## Introduction and Expansion of Improved Pigeonpea (Arhar) Production Technology in Rainfed Upland Ecosystems of Odisha

### Technological Empowerment and Sustainable Livelihood

*Information compiled by*

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Patancheru 502 324, Andhra Pradesh, India



**Government of Odisha**

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# Odisha and ICRISAT

*A Partnership for Technological Empowerment and Sustainable Livelihood  
for Smallholder Farmers in the Rainfed Upland Ecosystems of Odisha*

## Background Information

Odisha State, (17.49'N to 22.34'N and 81.27'E to 87.29'E), is located on the eastern coast of India. There are three main seasons in the state: summer (March to June), rainy (July to October) and winter (November-February). The annual rainfall varies from 1140 mm to 1716 mm, and the rainfall increases from west to east. Maximum temperatures during the year ranged from 24°C to 45°C and minimum temperatures ranged from 17°C to 22°C. The total agricultural land area of Odisha is about 8.7 million hectares, of which 1.9 million hectares is irrigated and the rest is rainfed. About 70 percent of the population lives in villages, and 85 percent of the total workforce depends on agriculture.

A large section of farmers in the rainfed upland ecosystems of Odisha have remained isolated from improved cultivars and management practices of pigeonpea for various reasons. There is ample scope for the expansion of high yielding short and medium duration pigeonpea varieties and hybrids in the rainfed areas for developing sustainable livelihoods through a farmer participatory approach, which led to the implementation of this project.

The project entitled '**Introduction and Expansion of Improved Pigeonpea (Arhar) Production Technology in Rainfed Upland Ecosystems of Odisha**' is funded by the Government of Odisha under the Rashtriya Krishi Vikas Yojana (RKVY) sub-scheme 353 No. 15(03)/19/2011). This was approved on 23 May 2011 for a period of 4 years (2011-2014) with a total budget of ₹10.253 crores (US\$2.29 million – US\$1 = ₹60 approx.) to cover five districts (Balangir, Boudh, Kalahandi, Naupada and Rayagada). The project was officially launched on 09 August 2011 at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Headquartered in Patancheru, Andhra Pradesh, India.

The overall goal of this project is to enhance food and nutritional security and income generation for the underprivileged farmers of rainfed areas of Odisha with the following objectives:

- a) Evaluate and identify newly developed high yielding disease resistant varieties and hybrids of pigeonpea for further introduction and expansion
- b) Promote cultivation of high yielding pigeonpea varieties and hybrids in the marginal soils
- c) Develop village-level seed delivery systems to achieve self-sufficiency in seed of farmer-preferred improved varieties and hybrids of pigeonpea
- d) Conduct capacity building of farmers, NGOs, and Self-Help Groups in sustainable pigeonpea production technology components
- e) Enhance profitability by linking production with dal (split pea) processing and marketing
- f) Provide research backstopping for refinement and research on pigeonpea and Improved Pigeonpea Production Technology (IPPT) components as identified by researchers and farmers in the target area.

Pigeonpea is one of the most important pulse crops of Odisha with very low seed replacement ratio of 2-3% because the proportion of quality seeds available each year is 10-12% of total production. Productivity is less than 600 kg/ha, which is well below the national average of 700 kg/ha. Approximately 80-90% of all planting materials used is largely sourced from farmers' own-saved seeds (local landrace) and this is used on a continuing basis for about 3-4 years. Production is concentrated in Cuttack, Puri, Kalahandi, Koraput, Dhenkanal, Balangir, Rayagada, Naupada and Sambalpur districts. Pigeonpea is an affordable source of protein (22-24%), contains a good source of essential amino acids, carbohydrates, vitamins and minerals, which makes it an excellent crop to promote food and nutritional security in Odisha. Aside from the benefits derived as food, 15-20 tons/ha of fuel wood from pigeonpea plants can provide energy @ 4,000 Kcal/kg wood; pigeonpea can fix nitrogen at about 40 kg/ha and it can effectively protect the soil from erosion. Pigeonpea can withstand drought, requires minimal inputs, and can be utilized as quality fodder and feeds for livestock. Pigeonpea, therefore, has several qualities, which can fulfill various social, nutritional, and economic needs of Odisha farmers. It is expected that the integration of its production along with soil and nutrient conservation will pave the way for agricultural prosperity of rainfed upland ecosystems in Odisha.

## Strategy and Approach

Harnessing the potential of rainfed upland ecosystems calls for a science-led farmer-centric approach. As an example, identification of a niche for introducing and expanding pigeonpea cultivation to increase and sustain its production in Odisha is anticipated to increase productivity, minimize land degradation, and increase incomes of subsistence farmers. The project is farmer-driven, farmer-implemented, and farmer-owned. The researchers and extension personnel play a catalytic and guiding role through the provision of technical options to farmers and helping them to make appropriate choices. The research and development process aims to integrate locally adapted improved cultivars of pigeonpea, improved crop production technologies, and crop management practices.

The project is managed and implemented by ICRISAT in collaboration with the Department of Agriculture (DoA), NGOs and selected farmer seed growers. A work plan for each year is prepared before the sowing season. Local staff organize aspects related to field supervision, seed distribution to identified growers, monitoring of crop and dissemination of information. Appropriate sites and cultivars are selected for evaluation in consultation with local farming communities using a participatory approach. Training and awareness activities in pigeonpea production and utilization technologies are also organized. The project coordinator is responsible for implementing various activities and preparing project reports. While ICRISAT, which has the necessary infrastructure, facilities and seed material, provides training and logistical support for pigeonpea research and development, DoA facilities are utilized for executing the project activities.



## Improved varieties and hybrids grown in Odisha

Varieties/hybrids evaluated under Improved Pigeonpea Production Technology (IPPT) and in seed production

### **IPPT and Seed Production:**

1. Maruti – High-yield (HY), Medium-duration (MD), Wilt resistant
2. Asha – HY, MD, Wilt and Sterility mosaic resistant
3. ICPL 88039 – HY, Short-duration, suitable for rice fallows
4. ICP 7035 (Kamica) – HY, MD, Wilt and SM resistant
5. ICPH 2671 – HY, MD, Hybrid, Wilt and SM resistant
6. ICPH 2740 – HY, MD, Hybrid, Wilt and SM resistant

### **Farmer Participatory Varietal Selection Trials:**

1. ICPH 3762 – HY, MD, hybrid, Wilt and SM resistant
2. ICPH 2740 – HY, MD, Hybrid, Wilt and SM resistant
3. ICPH 2671 – HY, MD, Hybrid, Wilt and SM resistant
4. ICPH 3933 – HY, MD, Hybrid, Wilt and SM resistant
5. ICPH 2751 – HY, MD, Hybrid, Wilt and SM resistant
6. Asha – HY, MD, Wilt and SM resistant
7. Maruti – HY, MD, Wilt and Wilt resistant
8. ICP 7035 (Kamica) – HY, MD, Wilt and SM resistant
9. Lakshmi – HY, MD, SM resistant and suitable for Rabi season



## Success stories from Naupada district





## Pigeonpea helps provide a better life for his children



|                       |                           |
|-----------------------|---------------------------|
| <b>Farmer's Name:</b> | <i>Lalit Bhora Sagria</i> |
| <b>Village:</b>       | <i>Goimundi</i>           |
| <b>Block:</b>         | <i>Khariar</i>            |
| <b>District:</b>      | <i>Nuapada</i>            |
| <b>Variety:</b>       | <i>Asha</i>               |
| <b>Area:</b>          | <i>0.40 ha</i>            |
| <b>Yield:</b>         | <i>450 kg</i>             |

**Lalit Bhora Sagria**, aged 47 years, son of the Late Hadu Bhora Sagria and third among four brothers, resides in a small village, Goimundi of Khudpej GP in Khariar block of Nuapada district. His father had 8 ha of land (low land – 3.2 ha, medium land 2 ha and upland 2.8 ha). In due course of time he inherited 2 ha of his family land.

Both Sagria and his wife have had some schooling, but have not passed the 10<sup>th</sup> class, so land is their only means of livelihood throughout the year. He has a large family with four daughters and two sons, and has been working very hard over the years to give his children a good education. Sagria does not have a television or radio for entertainment in his home, and his house is in need of repair. However, he has a cycle for his own transportation, a pair of bullocks for farming, a bullock cart for transporting agricultural produce, a sprayer, a well dug on his homestead, and some fruit trees planted near his house.

The entire family devotes their time to their 0.4 ha homestead throughout the year, growing different vegetables. The

major portion of Sagria's income comes from selling these vegetables in local village markets (weekly haat) using his cycle for transportation. The remaining 0.4 ha of low and medium land is utilized every year for growing paddy only.

Sagria was not sure how to make use of his uplands of 1.2 ha, for although it makes up a major portion of his land, it provided only marginal returns every year. His uplands have a soil texture of sandy loam to silty







loam, is on a sloping terrain and is purely rainfed, so every year, he either cultivates short duration local paddy (Setka dhan), or blackgram, horsegram, and even a local pigeonpea crop here. He would prepare the field haphazardly, broadcast the seed, and harvest whatever that produced.

In 2012, Sagria attended a meeting organized by ICRISAT at his neighboring village Bendrabahal. He thus learned about the improved variety of pigeonpea, its suitability in the uplands, its multi-beneficial effects on the land, and its profitability. He decided to try out the seed production program in 0.8 ha of his uplands, and enrolled and received input of (Breeder seed) variety Asha along with DAP fertilizer enough for a basal dose.

Following the training he received, and from reading the leaflet on the package of practices to grow pigeonpea, he prepared the land carefully. He ploughed the field 4 times, then leveled it with a country leveler (called *Moi* in the Oriya language). Using a rope to make a straight line, he planted the seeds at 3ft x 1ft (90 cm x 30 cm) spacing

on 15 and 16 July 2012 and applied the fertilizer in the space between two seeds in a row.

Observing good germination of the seeds, the entire family became engaged in the pigeonpea field. Weeding and hoeing was done after 1½ months along with application of a second dose of DAP fertilizer, followed by earthing up between the rows of the entire crop. As a result, good vegetative growth followed. However, during the last part of August, there was rainfall and a part of his land was submerged for several days. This caused yellowing of the plants, which eventually died.

During the flowering stage, Sagria had observed flower drop and pest attack (Aphid-Lakhi). He immediately sprayed the plants with Trizophos twice at an interval of 15 days, and also applied Plantaid & Planofix thereafter, when the flower dropping ceased.

Thereafter, Sagria got good podding and ultimately harvested the crop in the first week of November. He got 450 kg from 0.8 ha, and sold 350 kg to ICRISAT for ₹21,000. He kept aside 100 kg for his home consumption and as seed.

Sagria said this earning of ₹21,000 was a big boost to his income, helping with managing his household needs, purchasing new clothes for his children and also spending on a number of big expenses such as marriage gifts for his relatives. He is quite content with his pigeonpea crop. Though the yield was not satisfactory in 2012 due to the rains, this income was far better than the income he was getting in previous years.

Pre-planning his activities for 2013, Sagria carried out the land leveling work, made the stony portion of the land cultivable, and made the area weed and grass free, which were hurdles in 2012. This year, he is cultivating pigeonpea in his entire 1.2 ha of land with the Kamica variety of pigeonpea, supplied from ICRISAT for Foundation seed production.

## Ready to sow pigeonpea this year too



|                            |                        |
|----------------------------|------------------------|
| <b>Name of the farmer:</b> | <i>Subash Ch Patel</i> |
| <b>Village:</b>            | <i>Bhaludungri</i>     |
| <b>Block:</b>              | <i>Khariar</i>         |
| <b>District:</b>           | <i>Naupada</i>         |
| <b>Block:</b>              | <i>Khariar</i>         |
| <b>Variety grown:</b>      | <i>Maruti</i>          |
| <b>Class:</b>              | <i>Foundation Seed</i> |
| <b>Area:</b>               | <i>0.4 ha</i>          |
| <b>Yield:</b>              | <i>480 kg</i>          |

**S**ubash Ch Patel, son of Lochan Patel, aged 38 years, is a leading young farmer, dwelling at Village Bhaludungri of Bhojpur Gram Panchayat in Khariar Block of Nuapada district. He has a medium family with 7 members and has 2.4 ha (6 acres) of cultivable land of which 0.8 ha (2 acres) land is in the rainfed upland.

Every year he has been cultivating small millets in these uplands, sometimes changing the pattern to groundnut. However, during 2012 Patel attended a

village meeting organized by ICRISAT and SVA (a local NGO) and came to know about the profitability of pigeonpea cropping with high-yielding varieties (HYV). He decided to cultivate the crop on 0.4 ha (1 acre) of his upland on a trial basis though he was still doubtful about its production potential as described by ICRISAT staff members.

Under the seed production program, he was supplied with 3 kg Maruti Foundation seed along with 40 kg DAP fertilizer. He followed the complete package of practices



including 4 round ploughing, line sowing on flat land with 2.5 ft × 1 ft (75 cm × 30 cm), sowing 1 seed per hill, and applying basal dose (20 kg) of fertilizer.

After one and a half months, he did the hoeing, weeding and earthing up work, and applied the remaining 20 kg of DAP fertilizer. Besides, he carried out manual weeding two more times after 2 months and 3 months of sowing. He also top dressed the 20 kg of urea during the 3<sup>rd</sup> month of sowing. Expecting pest attack, he applied 1 litre of the pesticide Corsa two times with the dose 3ml/l water. During flowering, he applied 200 ml Planofix two times to stop flower drop.

For the entire crop, he spent about ₹8100 on labor charges and for purchasing inputs,

which includes the cost of inputs supplied from ICRISAT. He got a yield of 480 kg from 0.4 ha, of which he sold 300 kg seed to ICRISAT and got ₹19,500 at the rate of ₹65/kg. He kept 180 kg of seeds for his home consumption as well as for cultivation in the next season.

During 2011, Patel had only got a profit of ₹700 from cultivating small millets and ₹10,000 from groundnut, intercropping them in the field. In 2012, he was happy to get ₹23,100 as net profit from the same land by cultivating pigeonpea. Appreciating ICRISAT's role in his profits, this year, Patel has cultivated pigeonpea in his entire 0.8 ha (2 acres) of land.



## Not just beautiful, but profitable as well!



|                            |                          |
|----------------------------|--------------------------|
| <b>Name of the farmer:</b> | <i>Chapadhari Behera</i> |
| <b>Village:</b>            | <i>Domjhar</i>           |
| <b>Block:</b>              | <i>Boden</i>             |
| <b>District:</b>           | <i>Naupada</i>           |
| <b>Variety grown:</b>      | <i>ICP 7035</i>          |
| <b>Class:</b>              | <i>Foundation Seed</i>   |
| <b>Area:</b>               | <i>1 ha</i>              |
| <b>Yield:</b>              | <i>500 kg</i>            |

**Chapadhari Behera** is an illiterate but wise farmer. Aged 58, he resides in the Domjhar village of Boden block of the Naupada district of Odisha with his large family of eight members. He has a total of 4.5 hectare (ha) of cultivable land with 1.5 ha of upland land situated fortuitously besides a small rivulet on one side and a perennial tank on the other side. Knowing its potential, Behera grows groundnuts here

every year in this upland area. In 2011, he earned ₹8,200 as net profit from this area alone.

In 2012, Behera attended a village meeting held at Domjhar by ICRISAT and Sahabaghi Vikas Abhiyan (a non-governmental organization), where he paid attention to all the discussions regarding pigeonpea cultivation. This sparked his interest, so





he replaced the usual groundnut cultivation with pigeonpea. ICRISAT had advised that cultivation of the long duration pigeonpea variety, ICP-7035 (called Kamica), required assured irrigation as the crop took 210 days to mature. Behera was the best choice to grow this variety, as he met all the requirements, so ICRISAT asked him to cultivate 1 ha of his upland land with this variety.

Following all recommended procedures, Chapadhari Behera sowed the seeds of ICP-7035 in lines with a spacing of 3 ft × 1 ft (90 cm × 30 cm), but he soon despaired when he saw the profuse growth of weeds and grass in his field. In spite of receiving suggestions from the ICRISAT staff regarding weeding and inter-culture, he almost quit, as he couldn't afford to hire labor for weeding. However, after a period of three months the crop surpassed the critical stage of crop-weed competition and became tall and branched. Now it was time for flower bud initiation, and a promising cluster of red flowers emerged on the crop.

This development encouraged him and he began visiting the field every day to

see the progress. Behera was overjoyed at the flowering, but unfortunately heavy rain caused the loss of a sizable number of flowers. He was stressed out once again. However, he noticed that the crop recovered very fast and produced a second flush of flowers. Thereafter, podding started and he saw that almost each flower turned into a pod. Behera was enthusiastic and started telling all the neighboring farmers about this phenomenon. He now had another problem – his revelations forced him to build a fence around the area and keep watch over the crop even during the night, because he had noticed that people were attracted to the crop and had started plucking immature pods, consequently reducing the produce. Nevertheless, after six months, he got a yield of 500 kg from this 1 ha of land, something beyond his imagination.

From the produce, Behera sold 320 kg and kept 100 kg for his own consumption and for seed production. Besides this, he sold 60 kg of seeds at the rate of ₹60 per kg (₹3600) at the village market, and was also able to give 20 kg of seeds to his daughter's home as a gift.



Subtracting the expenditure (₹9000) as cost of investment, Behera earned around ₹23,200 as net profit from 1 ha of land. From this profit, he saved ₹10,000 in his State Bank account and the rest of the money was spent on daily household expenses.

Chapadhari Behera praises ICRISAT a lot for this Kamica variety of pigeonpea. He confessed that if he had also followed the suggestions of the ICRISAT staff for weeding and inter-culture, it would have given him at least 200 to 300 kg of additional yield. Also, he praised the variety for producing multiple flushes of flowering, which he had seen for the first time in pigeonpea. This year he planted this crop variety in 1 ha of his land and has encouraged many other farmers to do the same. This has had a lot

of impact and the news has automatically spread to other villages as well.

ICRISAT also noticed that the Kamica variety matures within 180 days in the Nuapada agro-climate, instead of in the normal 210 days, which is an important reason for the farmers to adopt it. Another encouraging characteristic is that the pod bearing is very good even in undergrown and small plants. The bold and reddish colored seeds can also be used as a vegetable in the premature stage, and as *dal* (split pea) in the mature stage.

Chapadhari Behera admitted that he saw these red flowers of pigeonpea for the first time in his 58 years. He is grateful that it is not only a beautiful sight, but more importantly, it also gives him a bumper yield and profit.

## Profit beyond expectation



**Name:** Tularam Sabar  
**Village:** Suklimundi  
**Block:** Komna  
**District:** Nuapada (Odisha)  
**Variety:** ICPH 2740  
**Class:** Hybrid seed production (A X R)  
**Area:** 0.80 hectare  
**Yield:** 500 Kg hybrid seeds

**T**ularam Sabar, aged 50 years, resides in Suklimundi village of Komna block, Nuapada district of Odisha. He is a literate farmer with 6 members in his family. In perpetuation of his family property, he inherited 1.62 ha of land and also bought himself 0.8 ha of land in his village in 2005. Having made plans to grow a small mango orchard in this 0.8 ha upland property, and with the help of the District Horticulture Office, he planted 115 mango grafts here in 2008.

Every year, Tularam Sabar also cultivated a variety of crops during the *khari*f season within the orchard, such as upland paddy, groundnut, cotton and finger millet.

The following table gives his Cost:Benefits for 2008-2012.

| Year | Crop                 | Expenditure (₹) | Total return        | Net profit (₹) |
|------|----------------------|-----------------|---------------------|----------------|
| 2008 | Finger millet        | 500             | (50kg)-<br>₹1000    | 500            |
| 2009 | Upland paddy         | 2000            | (1000 kg)-<br>₹6000 | 2000           |
| 2010 | Ground-nut           | 5000            | (650 kg)-<br>₹12500 | 7500           |
| 2011 | Cotton               | 5000            | (200 kg)-           | 7000           |
| 2012 | (A x R)<br>ICPH 2740 | 3800            | (490 kg)<br>₹31,850 | 28,050         |

In 2012, he came in contact with ICRISAT staff members and became interested in being a part of the Hybrid seed production of pigeonpea ICPH 2740, which was being grown for the first time, not only in Nuapada district, but also in the state. Sabar was very enthusiastic in following all instructions for cultivating the crop very carefully. Following instructions, he sowed the seeds of A- and R-lines in a 3:1 ratio, keeping the spacing of 3 ft x 1 ft (90 cm x 30 cm). He made the mistake of sowing the R-line seed 10 days after the sowing of A-line, due to which there was imbalance in plant growth. Due to the delay, he wondered whether it would be possible for the plants to bear pods or not.

In the meantime, during the visit of ICRISAT scientists to his fields, he was urged to ensure enhancement of the R-line growth. Following this instruction, he applied 15 kg urea to the R-line. He took care of the interculture in a timely manner, made the bunding and provided irrigation once during the pre-flowering stage. Thereafter, he noticed good flowering and podding.

He harvested the crop by plucking the pods on 5 January 2013 and got a yield of 500 kg seed from the A-line plants and 100 kg from the R-line plants. As instructed, he initially

harvested the R-line, then the A-line, and kept the produce separately.

Sabar had spent ₹3800 on the crop (besides the supply of seeds and 80 kg DAP fertilizer provided by ICRISAT). He sold 490 kg of seeds to ICRISAT at the rate of ₹65/kg and got ₹31,850 for it. He kept the R-line seeds for preparing dal in his home and supplied 10 kg of A-line hybrid seed to a relative in Khariar block for cultivation. As net profit, Sabar got ₹28,050 from the 0.8 ha field, a sum well beyond his expectations. He had not earned so much profit from crops in previous years.

He utilized this money for digging a deep bore-well in the field at a subsidized cost

with help from the Government of Odisha Agriculture Department.

This year, Sabar left some of last year's plants in 0.4 ha area, keeping them well-irrigated so that they have good vegetative growth at present. He is now trying to find out whether flowering and fruiting is possible.

In 2013, Sabar leased the 1.2 ha plot and is cultivating a total of 1.6 ha of land with the Asha variety of pigeonpea under the Seed production program of the project.

Having been inspired from last year's cropping, farmers from Thikpali Gram Panchayat invited ICRISAT to their village for advice and are now cultivating pigeonpea in 35 ha under the Odisha Pigeonpea Project.

## A lesson learned



|                       |                    |
|-----------------------|--------------------|
| <b>Farmer's Name:</b> | <i>Mansingh Sa</i> |
| <b>Village:</b>       | <i>Karanbahali</i> |
| <b>Block:</b>         | <i>Sinapali</i>    |
| <b>District:</b>      | <i>Nuapada</i>     |
| <b>Variety:</b>       | <i>Asha</i>        |
| <b>Class:</b>         | <i>Breeder</i>     |
| <b>Area:</b>          | <i>0.40 ha</i>     |
| <b>Yield:</b>         | <i>300 kg</i>      |

I remember the day at Jugenpadar village in Sinapali block, where so many people gathered along with ICRISAT scientists. I was fortunate to hear about the improved packages and practices for pigeonpea cultivation, and also visited the crop at Jugenpadar. I realized that Arhar (pigeonpea) can be sown in a line with surprising vegetative growth, flowering and heavy podding. I was inspired, and then and there decided to grow the crop in my own land at Karanbahali.

I attended the village meeting organized by ICRISAT, and enrolled as a beneficiary to grow pigeonpea. I received 8 kg Breeder seeds of the Asha variety, and 40 kg DAP fertilizer for the 0.40 hectare of my upland area. But, I had to engage immediately for transplanting rice. So, I decided to go for broadcasting the pigeonpea, although I had promised the ICRISAT staff that I would do line sowing. On the day I broadcast the seed, the Block Co-ordinator of ICRISAT visited my field and reminded me to go for line sowing. I had covered 0.06 hectare with broadcasted pigeonpea and for the rest of

the area (0.34 hectare) I followed the line sowing technique with 2.5 ft × 1 ft (75 cm × 30 cm) spacing.

After 2 months, I followed the intercultural practices in the line sown area, whereas in the broadcasting area, due to heavy grass and weed problems, I couldn't do the weeding and inter-culture. Finally, I got only 30 kg seed from the broadcast field, and 300 kg Foundation seeds from the 0.34 hectare. Needless to say, I regretted my mistake of broadcasting instead of line sowing.

From my total produce of 330 kg, I sold 130 kg at the rate ₹65/kg and received ₹8450 from ICRISAT. I had spent only ₹700 as input, mainly on labor for the cultivation, so got a net income of ₹7,750 from 0.34 hectare of land. I distributed about 20 kg to my relatives and kept 150 kgs for my home consumption and as seed for my next sowing.

I have learned my lesson, and in 2013 I cultivated 0.81 hectare of land with the Maruti variety of pigeonpea, and following the line sowing method.



## Triple the profit from a third of the land



|                  |                            |
|------------------|----------------------------|
| <b>Name:</b>     | <i>Debadutta Podh</i>      |
| <b>Village:</b>  | <i>Bendrabahal village</i> |
| <b>Block:</b>    | <i>Khariar</i>             |
| <b>District:</b> | <i>Nuapada (Odisha)</i>    |
| <b>Variety:</b>  | <i>Asha</i>                |
| <b>Class:</b>    | <i>Breeder</i>             |
| <b>Area:</b>     | <i>0.40 hectare</i>        |
| <b>Yield:</b>    | <i>450 kg</i>              |

**D**ebadutta Podh, a young farmer of Bendrabahal village of Khariar block, Nuapada district, Odisha, matriculated and began working without payment as a teacher in a private school of his village. But, his family was poor, and being the eldest in his family, he was obliged to earn a living. He decided to leave teaching and found a job in the Agriculture sector. Being more educated than the normal farmer, he often came in contact with staff of the government department of agriculture, and became aware about the government opportunities available for improving agriculture.

Mr Podh has a total of 2.82 hectares of land, of which 1.21 hectare is upland. In this 1.21 hectare of land, he always grows small millet, blackgram, greengram and horsegram every year, and manages to earn between ₹5000 to 6000 as net profit after spending ₹3000 on inputs and labor expenses. When he first came in contact with a Field Assistant of ICRISAT and heard about the high yielding variety of pigeonpea, he asked about the total cultural practices. The Field Assistant readily provided him with a leaflet regarding the cultural practices for growing pigeonpea.

Podh decided to grow the crop and enrolled his name for receiving 8 kg seeds of pigeonpea Asha variety for 0.40 hectare of his land, along with 40 kg DAP fertilizer. He followed the line sowing practice and sowed the seed on 22 July 2012, keeping spacing of  $2.5 \times 1$  ft (75 cm  $\times$  30 cm). He applied 20 kg of the DAP fertilizer as basal dose, and did the first manual weeding after a month and a half. He applied the remaining 20 kg of fertilizer, then earthed-up the field, and did the second weeding. On his own initiative, he applied 10 kg of urea to the field. Also, to prevent the crop from drying up due to lack of rain, he used a diesel pump to irrigate the







field once from his well. This helped a lot to produce good flowering and podding right from the first flush of flowering.

Podh visited his field every day and took great care of his crop. There was no incidence of any disease or pest in his field, however, as a precautionary measure, he applied Trizophos once with 2.5 ml/liter water to his crop to protect the crop from pod borers. According to his calculations, he spent about ₹5400 for this cultivation, of which the ICRISAT contribution was of ₹1800.

Podh harvested the crop on 10 January 2013, and got 450 kg of Foundation seeds from this. He sold 320 kg to ICRISAT at the rate of ₹65/kg, earned ₹20,800, kept 80 kg for his home consumption, and distributed about 50 kg among his relatives. At the end of the

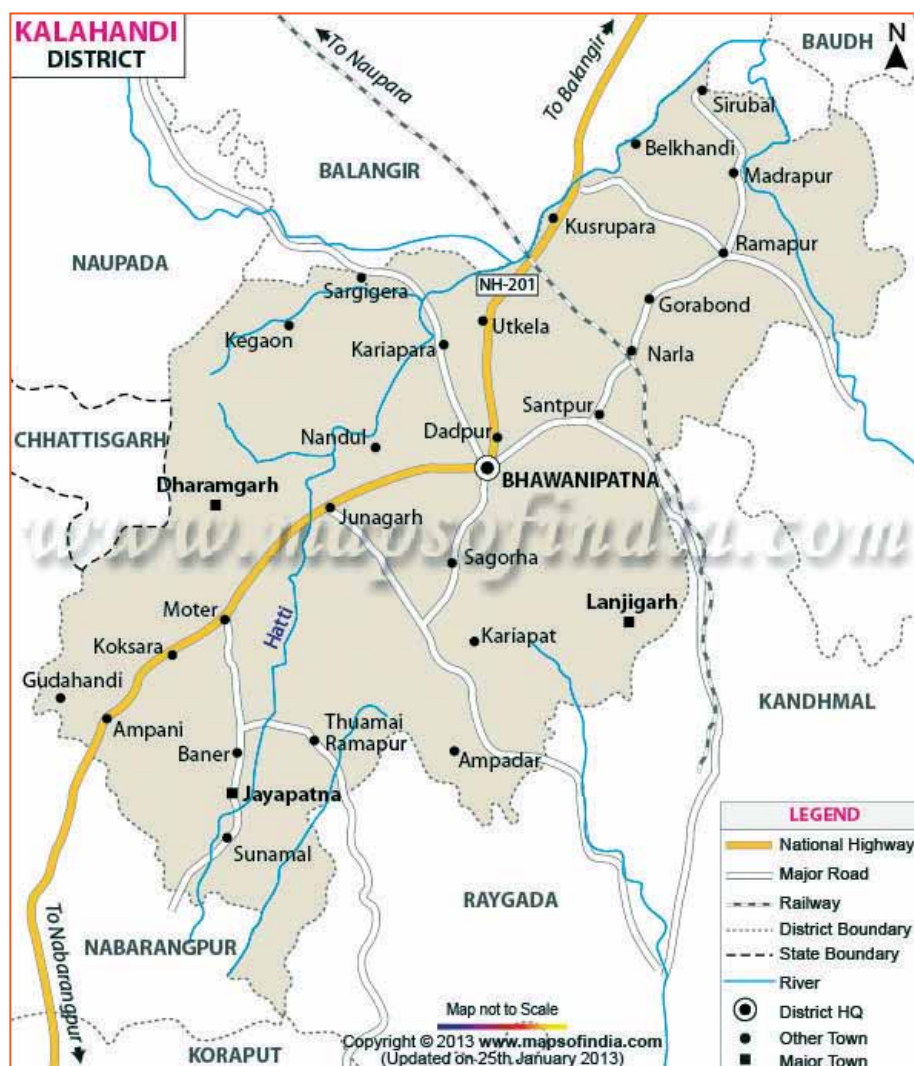
season and he was very happy to get a net profit of ₹15,400 from just 0.40 ha of his land.

The success of the previous year influenced Podh to once again grow the Asha variety, and this time in 1 hectare of land. He has become a role model for neighboring farmers, who look up to him as an educated farmer. He was able to convince fifteen other farmers of his hamlet to grow this crop in 2013, covering an area of 10 ha.

Mr Podh has decided to be involved in producing pigeonpea seed on a regular basis, even after the project is over. He has plans to dig a deep bore well in his upland, and run a seed production program on a commercial basis.

Podh thanks ICRISAT for encouraging him, and thanks God for helping him to fulfill his dream.

# Success stories of Kalahandi district





## Expansive cultivation for maximized profits



|                       |                            |
|-----------------------|----------------------------|
| <b>Farmer's Name:</b> | <i>Bikas Pradhan</i>       |
| <b>Village:</b>       | <i>Sikerguda</i>           |
| <b>Block:</b>         | <i>Bhawanipatna</i>        |
| <b>District:</b>      | <i>Kalahandi</i>           |
| <b>Variety Grown:</b> | <i>Maruti</i>              |
| <b>Class:</b>         | <i>Foundation seed</i>     |
| <b>Area:</b>          | <i>2.02 ha</i>             |
| <b>Yield</b>          | <i>2000 kg (990 kg/ha)</i> |
| <b>Contact:</b>       | <i>+91 8339818869</i>      |

**Bikas Pradhan**, a farmer from Sikerguda village, Kalahandi district of Odisha, grew the Maruti variety of pigeonpea in his 2.02 ha plot during the 2012-13 *kharif* season.

ICRISAT Field Assistant of Bhawanipatna (Mr Madhusudan Mangaraj) had provided 15 kg of pigeonpea Breeder seed to Bikas Pradhan. He attended the Seed Grower's training program, which was held at Bhawanipatna on 6 June 2012. He was trained in advanced cultural management practices of pigeonpea, such as making ridges and furrows and sowing seeds on the ridges to maximize the germination percentage. He was also provided with information on the profitability of this variety of pigeonpea crop compared to other crops.

Pradhan also received from ICRISAT 200 kg (4 bags) of Di-Ammonium Phosphate (DAP) fertilizer to be used at the rate of 100 kg/hectare.

With the wealth of information he had gathered from ICRISAT, the farmer started cultivation of the Maruti variety pigeonpea in his fields by following most of the technologies to the best of his abilities. He completed sowing by 31 July 2012. He applied half the DAP fertilizer during

land preparation as a basal dose and the remaining after 30 days of sowing (during weeding and intercultural operations). Pradhan has also fenced in his property with barbed wire to avoid livestock grazing in his fields.

In September 2012, ICRISAT arranged a training program on integrated pest management (IPM) and integrated disease management (IDM) of pigeonpea at Bhawanipatna. As a participant, Pradhan learned effective ways of controlling pests and diseases. During the flowering and podding stages, Pradhan faced the problem of pod borer and maruca attack and severe flower drop. Unwilling to lose hope, he carried out one irrigation of his crop followed by one spraying with Triazophos as suggested by ICRISAT scientists and field staff. He was able to overcome these issues and get a good yield at the end of the season.

Pradhan got a yield of 2000 kg of Maruti Foundation seeds from his 2.02 ha of land (990 kg/ha), which is higher than the national average of 700 kg/ha. Of the 2,000 kg of pigeonpea seeds, he sold 1550 kg of Foundation seeds to ICRISAT during the seed procurement program and got an amount of ₹97,500 @ ₹65/kg of processed seeds. From





the remaining 450 kg of seeds, he sold 400 kg in the local market at ₹50/kg, and got an amount of ₹20,000. He used the remaining 50 kg of seeds for his home consumption as *dal*. Hence, his gross income from sale of this seed was ₹117,500.

Pradhan had spent ₹15,000 on land preparation, seed sowing, intercultural operations, labor charges for fertilizer applications, sprayings, irrigations, harvesting, threshing and storage. Hence, his net income (profit) was ₹102,500 from his 2.02 ha (or ₹50,742/ha). With the profit from this crop, he purchased a rotavator (farm equipment that helps in land preparation) and a drip-irrigation set. He was also happy with the dal made from the Maruti variety, opining that it tasted sweeter than the local cultivars.

In the *kharif* of the previous year (2011-12), Pradhan had grown paddy in his 2.02 ha area of land and had spent ₹40,000 on land preparation, leveling, transplanting, labor charges, fertilizer application, irrigation, pesticide sprayings, harvesting, threshing and storage. He got a harvest of 7500 kg of paddy (3713 kg/ha). He sold this paddy in the Government market (called “MANDI”) at the rate ₹12/kg, earning a gross income of ₹90,000 (₹44,554/ha). His net income was ₹50,000 (₹24,752/ha), which is 40% less than what he obtained from pigeonpea in 2012. Also, he explained that the paddy crop cultivation was more labor intensive than that of pigeonpea.

Pradhan has decided to continue pigeonpea seed production in his entire area of 6.07 ha in the coming years to maximize profits.



## Asha pigeonpea brings true hope



|                       |                             |
|-----------------------|-----------------------------|
| <b>Farmer's Name:</b> | <i>Indubhusan Swain</i>     |
| <b>Village:</b>       | <i>Boria</i>                |
| <b>Block:</b>         | <i>Kesinga</i>              |
| <b>District:</b>      | <i>Kalahandi</i>            |
| <b>Variety Grown:</b> | <i>Asha</i>                 |
| <b>Class:</b>         | <i>Foundation seed</i>      |
| <b>Area:</b>          | <i>2.8 h</i>                |
| <b>Yield:</b>         | <i>3000 kg (1071 kg/ha)</i> |

**M**r Indubhusan Swain, a leader farmer in Boria village of the Kesinga Block, having shown interest in adopting the new ICRISAT variety of pigeonpea, was selected as a beneficiary of the ICRISAT – ODISHA Pigeonpea Project, seed production program by the DCO, Kalahandi and Loksebak NGO, Bhawanipatna. He cultivated the Asha variety of pigeonpea on 2.8 ha of land in the *kharif* (rainy season) of 2012/13.

ICRISAT provided 21 kg Breeder seed of the Asha variety of pigeonpea, along with 280 kg of DAP fertilizer (@ DAP 100 kg/ha) to him, free of cost. Indubhusan Swain also attended the seed grower's training program conducted by ICRISAT on 6 June 2012, where the ICRISAT team provided information on all the improved technologies for pigeonpea seed production. He also got some booklets and leaflets on the cultural management practices as well as integrated pest management (IPM) and integrated disease management (IDM) of pigeonpea in the local Odia language.

The farmer followed the ICRISAT guidelines and made ridges and furrows and sowed the seeds maintaining a spacing of 90 cm

from row to row and 30 cm from plant to plant, and completed the sowing of his land by 15 July 2012. He applied DAP fertilizer provided by ICRISAT and MOP (Potassic fertilizer), which he bought himself, during land preparation. He sprayed a weedicide named BRIM (IMYZATHAPIR composition) in his field to control weeds, as suggested by the DCO, Kalahandi.

Swain attended another IPM and IDM training program conducted by ICRISAT at Bhawanipatna in the month of September





2012, where he was shown how to protect his pigeonpea crop from the impending pest and disease problems. He then sprayed his crop with Chloropyrriphous chemical thrice, once during the flowering initiation, once during the pod formation and then during the pod development stage. During the flowering period, he also sprayed Planofix (a plant growth hormone) on his crop.

In the month of January 2013, Swain harvested his pigeonpea crop manually. His 2.8 ha yielded 3000 kg (1071 kg/ha) of seeds, which is higher than the national average of 750 kg/ha.

He provided 2500 kg of clean Asha pigeonpea Foundation seeds to ICRISAT during the seed procurement program and received an amount of ₹150,000 for this @ ₹65 per kg. From the balance he sold 300 kg in the market @ ₹52 per kg of seed, and earned ₹15,600 from the sale.

Swain gave some of the remaining seeds to his farmer relatives as gifts and kept some

seeds for his own consumption. In total, his gross income was ₹165,600, of which, he had spent ₹23,300 against the cost of cultivation. Hence, his net income (profit) was ₹142,300. The approximate profit earned is ₹50,825/ha, which improved his economic standing. From this income, he purchased a 'Seed Driller' machine and used the rest of the income for family expenses.

In the previous year, 2011/12 (*kharif*), Swain had grown local pigeonpea varieties (Kandul) on 2 hectares of his farm land. He had purchased 56 kg seeds (20 kg/ha) from the local market for ₹2800 at a cost of ₹50 per kg. He had broadcast these seeds in his field and did not apply either fertilizer or pesticides to protect his crop from pest attack. He got a yield of 500 kilograms of local pigeonpea seeds from these 2 hectares of land, which is less than the national average of 750 kg/ha. He sold those seeds in the local market for ₹50 per kg (local market price for pure seeds was ₹52 per kg and for mixed seeds ₹50 per kg). His gross income was ₹25,000. Deducting the cost of cultivation from the gross income he earned a profit of ₹20,000 (net income). He earned a net profit of ₹10,000/ha, which was very low compared to the profit from the Asha variety of pigeonpea in the year 2012/13.

Mr Indubhusan Swain, the farmer, is very happy with the yield performance of the Asha variety of pigeonpea. He will not only continue to cultivate this variety, but will take the lead in promoting the production program of ICRISAT pigeonpea seed varieties in his village, as well as in the neighboring village, on a larger scale. He has also promised to provide good quality and pure pigeonpea seeds to ICRISAT in the coming years.

## Content with the right choice of pigeonpea seeds



|                       |                             |
|-----------------------|-----------------------------|
| <b>Farmer's Name:</b> | <i>Rajanikant Sa</i>        |
| <b>Village:</b>       | <i>Balbaspur</i>            |
| <b>Block:</b>         | <i>Narla</i>                |
| <b>District:</b>      | <i>Kalahandi</i>            |
| <b>Variety Grown:</b> | <i>Kamica</i>               |
| <b>Class:</b>         | <i>Foundation seed</i>      |
| <b>Area:</b>          | <i>1.21 ha</i>              |
| <b>Yield:</b>         | <i>1550 kg (1280 kg/ha)</i> |
| <b>Contact:</b>       | <i>+91 9438522215</i>       |

**R**ajanikanta Sa is an advanced farmer of Balbaspur village of Narla Block in the Kalahandi district of Odisha. Sa is keen to adopt new technologies, varieties and hybrids, and always tries to keep himself up-to-date with the new ideas in agriculture by attending every training program conducted by the Department of Agriculture at the block level, district level and state level. Sa has also attended a number of exposure visits both inside as well as outside the state.

In 2012-13, Sa showed interest in growing the Kamica variety of pigeonpea as suggested by the Department of Agriculture, Bhawanipatna and ICRISAT field staff. He attended the seed grower's training program conducted by ICRISAT at Bhawanipatna and gathered information about the high yielding varieties (HYVs) and hybrids of pigeonpea released by ICRISAT. He started land preparation, collected Breeder seeds of Kamica from ICRISAT and completed sowing by the last week of July 2012, and had several interactions with ICRISAT field staff members regarding the growth of his crop.

Sa also attended the integrated pest management (IPM) and integrated disease

management (IDM) training program for pigeonpea conducted by ICRISAT at Bhawanipatna in September. He was faced with severe pod borer and maruca attack in his field. However, he sprayed his crop thrice with Triazophous chemical after consulting with ICRISAT field officers.

In February 2013, Sa harvested his crop and got a yield of 1550 kg (1280 kg/ha) from 1.21 ha of land. He gave 1500 kg of pure Foundation pigeonpea seeds of Kamica variety to ICRISAT for processing under the seed procurement program and got an amount of ₹94,575 against his processed 1455 kg of seed. He had spent ₹15,000 to cultivate this crop, so his net income (profit) was ₹79,575. He used the remaining 50 kg of seed for his home consumption as *dal*. Impressed with the profit from his pigeonpea crop, the farmer expressed his interest to continue the cultivation of ICRISAT's high yielding pigeonpea varieties in 2013 also. He utilized the money earned to conduct his daughter's wedding.

In the *kharif* season of the previous year (2011-12), Rajanikant Sa had grown local pigeonpea, (bought from the market), in the same piece of land. He had carried out line sowing of that crop and had weeding





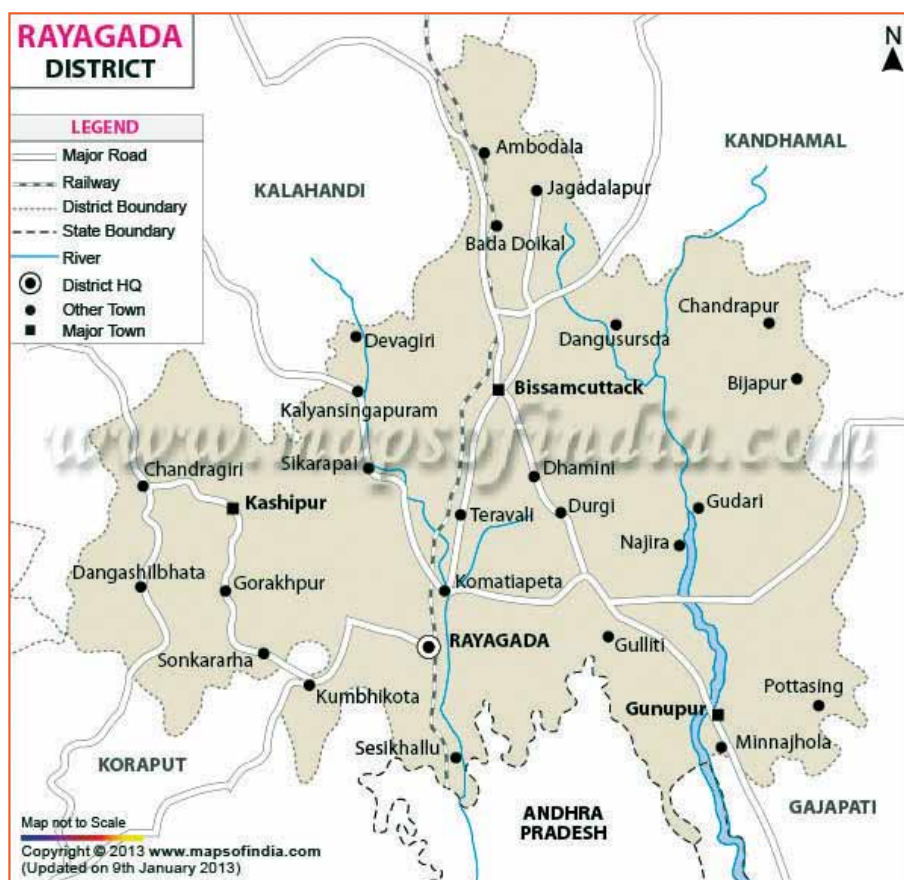
done as well. He had also applied some DAP fertilizer to the crop. He harvested a total of 600 kg of local pigeonpea seeds from this 1.21 ha of land, which he sold in the local market for ₹27,000. He had spent ₹7000 for land preparation, fertilizer application, seed sowing, labor charges, harvesting, threshing and storing, hence, his net income (profit) was ₹20,000. Compared to the profit obtained from the Kamica variety of pigeonpea in the 2012-13 cropping season, the local pigeonpea crop in 2011-12 had brought in less profit.

Sa was faced with a problem of pest attack (pod borer) and more flower drop in the

Kamica variety than in the local pigeonpea crop in the previous year. But, after explaining his concerns to ICRISAT staff, he irrigated the land under the pigeonpea crop once followed by one spraying with Triazophous pesticide and a second flush of flowers emerged. As a result, he got a good yield of 1550 kg of Kamica pigeonpea seeds from his land.

Rajanikant Sa expressed his appreciation to ICRISAT for providing good quality pigeonpea seeds of better performing varieties to the farmers, as well as for trying to improve the economic status of poor farmers of Kalahandi district.

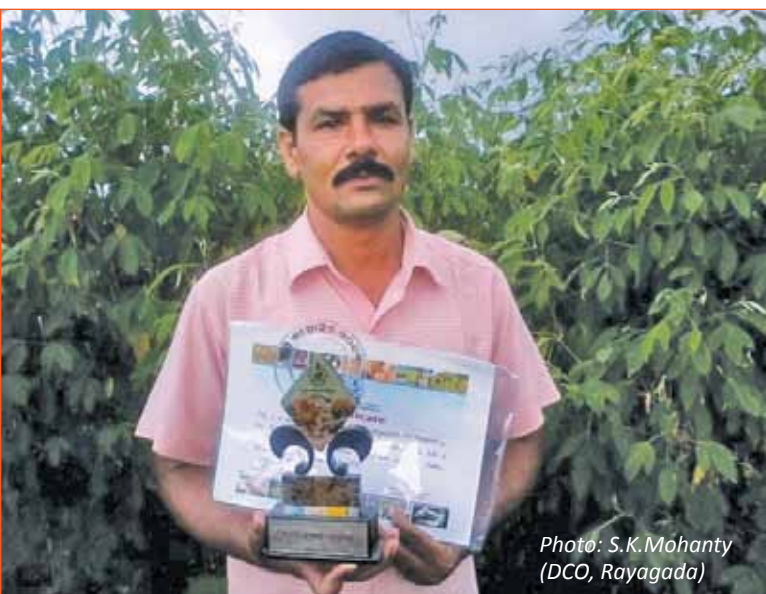
# Success stories of Rayagada district







## Pigeonpea enables Best Farmer Award



|                           |                             |
|---------------------------|-----------------------------|
| <b>Farmer's Name:</b>     | <i>Pradeep Kumar Panda</i>  |
| <b>Village:</b>           | <i>Antamoda</i>             |
| <b>Block:</b>             | <i>Kolnara</i>              |
| <b>District:</b>          | <i>Rayagada</i>             |
| <b>Pigeonpea Variety:</b> | <i>Maruti (Foundation)</i>  |
| <b>Seed Source:</b>       | <i>ICRISAT, Patancheru</i>  |
| <b>Cropping Pattern:</b>  | <i>Sole crop</i>            |
| <b>Seed Rate:</b>         | <i>8 kg/ha</i>              |
| <b>Area:</b>              | <i>5 ha</i>                 |
| <b>Spacing:</b>           | <i>90 cm x 75 cm</i>        |
| <b>Yield:</b>             | <i>6500 kg (1300 kg/ha)</i> |

**M**r Pradeep Kumar Panda, a progressive farmer of Antamoda village, Kolnara block, District Rayagada in Odisha, lives with his wife and son in a joint family with 5 other members, and owns 17 hectares of land on which he cultivates paddy, cotton, pigeonpea and maize.

In the year 2012, under the ICRISAT-RKVY Scheme, seed production program, Pradeep Kumar Panda cultivated pigeonpea of the Maruti variety on 5 ha of his land. He had sown seeds in a line with ridges and spacing of 90 cm × 75 cm. Using the prescribed methodology correctly, he applied fertilizers on time (100 kg DAP/ha). To control pest infestation, he had applied pesticides (Trizophus, DDVP and Confider) four times. Besides this, he followed all the other intercultural practices such as weeding, earthing up, thinning etc, properly and at the correct time.

From this land Panda harvested 6500 kg of seeds, approximately 1300 kg per hectare, more than double that of local varieties, where yield is hardly 500-600 kg/ha. He sold his produce at a cost of ₹5300 per 100 kg to the Odisha Agro Industries Corporation,

earning ₹344,500, whereas the local variety would have fetched a market price of ₹3000-3500 per 100 kg. His total expenditure was ₹180,000, so he got a net profit of ₹165,000.

In previous years, Panda had cultivated the local pigeonpea variety and cotton on this land. He recalls that he hardly ever earned more than ₹15,000/ha from both these crops, but from this new improved variety of pigeonpea, he made a profit of ₹30,000/ha.





From this profit he bought a bike and deposited the rest in the bank.

For this result and achievement, Panda got the Best Farmer Award of the district in the month of January 2013, and received a prize of ₹5000. Besides this, he also got a prize of ₹15,000 in the state level agriculture fair in the month of March, with a certificate from

the State Agriculture Department. Panda is proud and happy with his success, and for the following season he has planned to cultivate an area of 14 hectares with the Maruti (Breeder) variety. Learning of Panda's success, other farmers are also interested in cultivating around 16 hectares of this crop in their fields.



## Putting Hope to Work



Photo: SK Mohanty (DCO, Rayagada)

**P**urusotti Kondagiri, a 40-year-old farmer, lives in a household with his wife, a son, a daughter and his mother in Darabada village, Kolnara block, in district Rayagada, Odisha. He has no land of his own, but farms and cultivates land that he rents.

In the year 2012, after intensive village meetings and awareness generating activities, Purusotti Kondagiri agreed to cultivate, under the seed production program, pigeonpea variety Maruti (Foundation seeds), in place of the local varieties. In previous years he had cultivated different crops such as cotton, local pigeonpea and other minor millets on the 0.81 hectares of farm land that he leased from the land owner for ₹2000 per year.

During the season he had applied all the proper cultivation practices, such as line sowing with ridges, and weeding at proper

|                           |                             |
|---------------------------|-----------------------------|
| <b>Farmer's Name:</b>     | <i>Purusotti Kondagiri</i>  |
| <b>Village:</b>           | <i>Darabada</i>             |
| <b>Block:</b>             | <i>Kolnara</i>              |
| <b>District:</b>          | <i>Rayagada</i>             |
| <b>Pigeonpea Variety:</b> | <i>Maruti (Foundation)</i>  |
| <b>Seed Source:</b>       | <i>ICRISAT, Patancheru</i>  |
| <b>Cropping Pattern:</b>  | <i>Sole crop</i>            |
| <b>Seed Rate:</b>         | <i>8 kg/ha</i>              |
| <b>Area:</b>              | <i>0.81 ha</i>              |
| <b>Spacing:</b>           | <i>90 cm x 75 cm</i>        |
| <b>Yield:</b>             | <i>1400 kg (1728 kg/ha)</i> |

intervals, He had also sprayed pesticides such as Trizophos and DDVP twice to control pest attacks. Besides this, he had also applied DAP fertiliser @ 100 kilograms per hectare.

Purusotti Kondagiri's produce from this land at the end of the season was 1400 kilograms (1728 kg/ha) of pigeonpea seeds, whereas from the local varieties that he had cultivated earlier he had not gotten more than 800 kg from the same land area.

Of 1400 kg of seed, he retained 200 kg for himself and sold 1200 kg to ICRISAT @ ₹6500 per 100 kg. The local market price for the local variety of pigeonpea is ₹3000 - 3500 per 100 kg. He earned ₹78,000 for his produce. Since he had spent around



Photo: SK Mohanty (DCO, Rayagada)





₹20,000 on inputs on this land, he earned a net profit of ₹58,000.

Purusotti Kondagiri is very happy and is now brimming with new hope. He bought gold ornaments for his wife and daughter from

his profit, and has taken more land on lease. This year, he plans to lease 2 hectares of land, reduce his cotton area and cultivate more of it with pigeonpea variety Maruti (Foundation), which has given him more profit with less expenditure.

## The smile of a successful farmer



Photo: ICRISAT

**Damburu Pedenti**, a 56-year-old illiterate farmer of village Gobarapali, block Kolnara, in Rayagada, Odisha, lives with his wife, daughter and three sons. His eldest son is a teacher, the middle one helps him with cultivation and the youngest is a student in the intermediate level along with his sister. Pedenti owns 8 ha of land, where he has been growing multiple crops, like paddy, cotton, maize, blackgram and local arhar (pigeonpea) every year.

Last year, Pedenti cultivated 1.62 ha of land with the Asha pigeonpea variety (Breeder seed). At first, he was reluctant to cultivate this variety because he was unsure about its performance, but after rigorous awareness programs by ICRISAT, he agreed. Along with this variety, he also grew some local variety in an isolated patch. From this 1.62 ha of land he got a yield of 2300 kg of seeds with an average yield of 1420 kg/ha, which

|                           |                             |
|---------------------------|-----------------------------|
| <b>Farmer's Name:</b>     | <i>Damburu Pedenti</i>      |
| <b>Village:</b>           | <i>Gobarapali</i>           |
| <b>Block:</b>             | <i>Kolnara</i>              |
| <b>District:</b>          | <i>Rayagada</i>             |
| <b>Pigeonpea Variety:</b> | <i>Asha (Breeder)</i>       |
| <b>Seed Source:</b>       | <i>ICRISAT, Patancheru</i>  |
| <b>Cropping Pattern:</b>  | <i>Sole crop</i>            |
| <b>Seed Rate:</b>         | <i>8 kg/ha</i>              |
| <b>Area:</b>              | <i>1.62 ha</i>              |
| <b>Spacing:</b>           | <i>90 cm x 75 cm</i>        |
| <b>Yield:</b>             | <i>2300 kg (1420 kg/ha)</i> |

was very much more compared to local varieties, ie, the average yield of local varieties is 600 to 750 kg/ha. From his produce, he retained 200 kg of produce for his home consumption and sold 2100 kg to the Odisha Agro Industries Corporation @ ₹54/kg and got around ₹113,400 with a net profit of ₹80,000. The local market price would have fetched him only ₹30-35 per kg.

Using the profit he earned, Pedenti was able to spend more money on his children's education than in previous years. He also purchased 10 grams of gold for his daughter and repaired his old tractor. In the previous year, he had not taken proper care of his field, because he was not convinced

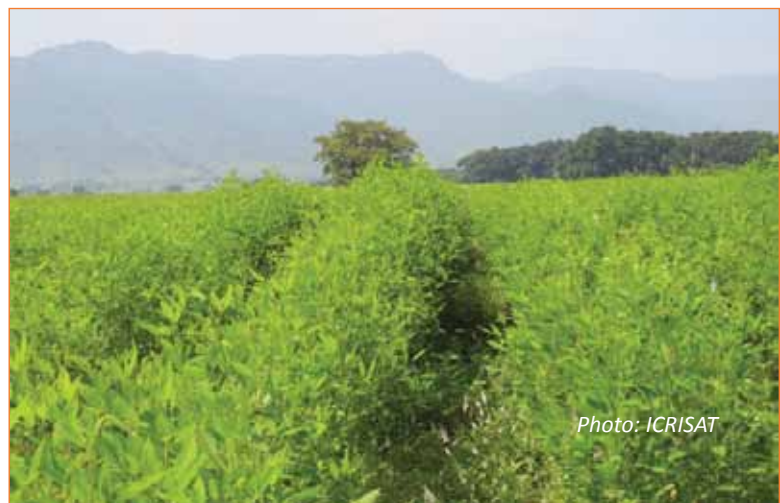


Photo: ICRISAT





that this variety is really profitable. But after seeing the profit he made (albeit with less care of the field) he has more than doubled the area he cultivated previously. This year he has sown 4 ha of land (2 ha under hybrid seed production (AXR) with variety ICPH-2671, and the other 2 ha of land under

Foundation seed production with variety Asha).

Damburu Pedenti is very happy with this success, and plans to soon stop his cotton and local variety cultivation, as they are less profitable than the improved varieties of pigeonpea.











## International Crops Research Institute for the Semi-Arid Tropics

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a non-profit, non-political organization that conducts agricultural research for development in Asia and sub-Saharan Africa with a wide array of partners throughout the world. Covering 6.5 million square kilometers of land in 55 countries, the semi-arid tropics have over 2 billion people, of whom 644 million are the poorest of the poor. ICRISAT innovations help the dryland poor move from poverty to prosperity by harnessing markets while managing risks – a strategy called Inclusive Market-Oriented Development (IMOD).

ICRISAT is headquartered in Patancheru near Hyderabad, Andhra Pradesh, India, with two regional hubs and five country offices in sub-Saharan Africa. It is a member of the CGIAR Consortium. CGIAR is a global research partnership for a food secure future.

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