



KALACHAMPA

The story of a registered variety derived from a landrace that raced into **mainstream...**

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Kalachampa, waiting for the recognition...

(Keonjhar) *Kalachampa*, a local variety of paddy has an impressive yield - 96 quintals/ hectare (fresh) or 75 quintals/ hectare (dry). Average yield of paddy in Odisha is 18 – 22 quintals / hectare. Apart from the impressive yield, it is very tasty and nutritious, and only one among several such local landraces. There are several other varieties of seeds (such as *Sethaka; Kinari; Jhilli; Kalamulia; Moyur Kantha, Sunamukahi, Samudrabali, Shetka*) that are exemplary in various ways, apart from yielding high volumes of produce. There could be numerous reasons why such seeds have been ignored by the mainstream agricultural establishment, and slowly, over a period of time, by farmers too. Can such seeds reach out to large number of farmers, who may benefit more from these landraces, through public delivery system? Can these landraces be considered as a viable option or only option vis-à-vis HYVs, hybrids and /or Genetically Modified Seeds that dominate the markets? If yes, how?

The story of Kalachampa tells us how this was made possible in Odisha....

Many farmers, in almost all parts of Odisha, prefer *Kalachampa* variety of paddy over government-supplied seed of **"high yielding varieties"**. There are many reasons behind this preference for *Kalachampa*, including higher yields. Its basal leaf sheet color is dark pink. It shows moderate resistance to biotic and abiotic stress. It requires less fertilizer. It can also resist brown plant hopper. Several varieties have nearly the same yield potential as *Kalachampa* but their cooking quality or amylose content was not as satisfactory. So *Kalachampa* is one of the most preferred varieties among the local landraces of paddy seeds.

In fact, the farmers in Odisha prefer local varieties of seeds in case of pulses, oil seeds and other crops also. Higher yield is not the only criterion for them, when they make a choice of crop. Unlike mainstream research institutions and universities, who generally put high premium on higher yields over many other qualities, with the departments of agriculture also having to fall in line, farmers in Odisha seem to have a range of selection criteria for seeds. For a long period of time, Department of Agriculture, Government of Odisha was not clear why the varieties of paddy seeds supplied by the department are not very popular among farmers, till that particular day, when Mr Chakradhar Panda found the advantages of *Kalachampa* variety, rather accidentally. That day was the turning point in the journey of *Kalachampa* seed, to reach farmers.

Mr Chakradhar Panda DGM (Marketing) and DGM (Processing & Quality Control), Odisha State Seeds Corporation, was supervising a crop-cutting event in Gopalpur, Agarpada village, in Badrak District, Odisha where the farmers and staff were measuring the yield of paddy. Mr Panda found that the yield of paddy in the plot which is adjacent appeared to be much higher. The crop-cutting was then done in this adjacent plot too. After a preliminary inquiry, he realized that the main reason behind this higher yield of the neighboring plot is '*Kalachampa*' variety of paddy seed. This is a local seed that is commonly used and preferred by many farmers in the village. This discovery was followed by a series of events that led to an unusual approach by the government department and a scientific research institution in bringing a farmer's variety (local landrace) into the formal seed distribution system in Odisha. However, the unexpected twist in the story of *Kalachampa* is that in the end, it was only a registered variety derived from Keonjhar *Kalachampa* landrace, that entered the formal seed system while the landrace did not.

This is one of those rare cases in India where a conscious effort was made to introduce a popular landrace into the government seed delivery system, after participatory characterization, adoption of scientific protocols of purifying the landrace and arriving at a set of defined characteristics. It is important to know the story of *Kalachampa* from Odisha because:

- It explains how committed senior government officers and scientists could go beyond routine administrative systems to do something useful to the farmers and agro-biodiversity in agriculture
- It shows how a large collaborative effort (among farmers, NGOs, research institutions and government departments at block, state or national level) could be orchestrated and sustained for a long period (more than five years) till the results are achieved, without any 'precedent' or a formal 'scheme' or laid-down protocols and guidelines
- It shows how new innovative systems can be evolved by 'inventing' appropriate interpretations of existing protocols to bring a transformation in the seed multiplication and distribution systems.

It tells us about the plight of a large number of useful and relevant traditional/ indigenous/ local landraces - of Farmers' seed varieties that are still waiting for recognition, public investments and mainstreaming.

Background – Odisha's farmers' preference for some paddy varieties

There was a very peculiar problem with respect to paddy seed varieties in Odisha. Though university and ICAR institutes regularly developed new improved varieties (read '*high yielding varieties*' or HYVs), acceptability of these varieties among farmers was very low in Odisha state. Only 4-5 varieties such as Swarna were accepted by farmers at large. Despite the easy access to HYV seeds through state-supported initiatives, the farmers still prefer local landraces and maintain a repository of landraces which perform very well in upland areas as well as inundated lands of Odisha. Situation is starker in the case of pulses, millets and oil seeds. No variety of pulses/ oil seeds that was introduced by Government has been acceptable to farmers in the last 20 years. It is found that farmers in Odisha still prefer to use many indigenous varieties of seeds.

These indigenous seeds (which are also called landraces, farmers' varieties, desi varieties, local varieties, traditional seeds, folk varieties) are preserved and informally exchanged among farmers for generations. The famous Jeypore tract from where *Oryza sativa* originated, is in Odisha. This region is considered the Centre of Origin and Diversity of Asian cultivated rice.



Visit of Principal Secretary to *Kalachampa* breeder seed production plot at Pipili farm during *Kharif* 2016



Thousands of varieties of paddy and other crops have been documented in Odisha, including in Adivasi regions like Koraput. Reports do indicate that these landraces have immense potential for production of food in a variety of agro-climatic conditions without jeopardizing the ecological security of nature. They are known to be stress-tolerant. It is also known that such indigenous varieties hold a deep socio-cultural significance for the local communities, other than preference in the local diets.

■ **Cataloguing of Landraces of Odisha**

Inspired by the presence of substantial diversity in seeds/ germplasm in regular agricultural practices of a large number of farmers, the Department of Agriculture and Farmers Welfare, Government of Odisha initiated the process of developing a catalogue of available landraces in the state in 2010. This idea was initiated and nurtured from 2010 onwards by Mr R S Gopalan, IAS who was the Director of Odisha State Agriculture Department. In this story of *Kalachampa*, Mr Gopalan's interest in indigenous seed varieties was one of the strong enabling factors behind the success of introduction of *Kalachampa* in the formal seed system. Another important enabling factor is the association of Mr Chakradhar Panda as the main anchor of this agenda within the department, throughout the time period. The interesting part of the story then is that this is not a story of a seed that originated in a modern science campus, or an agriculture research institution, but from farmers and an agriculture (extension) department!

■ **Importance of Sovereignty and Diversity**

Mr Gopalan's interest in seed sovereignty and diversity, and protection of traditional landraces against biopiracy was one of the main triggers in this story. The team of RS Gopalan and Chakradhar Panda together steered this entire process, along with civil society groups' and scientists' participation, till results were achieved. Dr SR Dhua, Central Rice Research Institute (CRRI, renamed as National Rice Research Institute in 2015) supported this team and provided necessary scientific guidance for seed characterization and purification. Dr SR Dhua, a committed scientist who is passionate about actual application of biodiversity principles in agriculture, found the right team focused on action that favors farmers and diversity in agriculture. A tour to the seed museum in CRRI for RS Gopalan facilitated by Dr SR Dhua helped to develop a vision on the importance of conserving the gene pool of seeds in Odisha. The trio figured out the next steps towards mapping, characterizing, purifying and registering various landraces, and this also led to the introduction of *Kalachampa* into the formal seed supply system, in an iterative process, that is exciting to know.



Odisha has rich diversity in paddy landraces / traditional varieties, particularly in the Adivasi areas. *Kalachampa* has a dark pink leaves in the lower canopy, shows moderate tolerance to biotic and abiotic stress and to brown plant hopper. Its good cooking quality, taste along with the other traits and good yield potential makes it attractive to farmers. It has an yield potential of 96 qt/ ha (fresh) or 75 qt/ha (dry). Average yield of paddy in Odisha is 18 – 22 qt/ ha.

This team explored various options to overcome the hurdles, interpreted the guidelines/ protocols in favor of farmers; challenged the existing norms and found newer solutions to old problems. The Department could pool financial resources from on-going *Rashtriya Krishi Vikas Yojana* (RKVY, a centrally sponsored scheme) to support these partnerships and also to create necessary infrastructure. They defended this process in all forums without compromising on technical and scientific principles of seed registration.

The Processes that Unfolded

Agricultural Universities/ ICAR institutions follow some laid-down protocols to test and standardize the characters of seeds; multiply and release them in the market/ seed supply system. Based on the advice from University/ ICAR institutions, Department of Agriculture 'supplies' these released seeds to farmers. It may take three to ten years of time to formally release and launch a new variety of seed, depending on the testing requirements. In this process, indigenous seeds are used as the base material. Certain characteristics and qualities of landraces are distinctly identified and new 'varieties' of seeds are created. These seeds are expected to perform with some specific characteristics (yield, resistance to pests, water stress, duration and so on) in different agro-climatic conditions.

Local varieties of seeds perform well in particular localities. They may not perform well in all locations/ regions. While it is important to understand how they perform in a particular location and why, not enough investments have been made on this front over the decades.



When there is huge diversity in seed germplasm, the starting point in conservation of diversity is to develop an inventory and catalogue of landraces. Directorate of Agriculture and Food Production, Government of Odisha conducted the initial surveys in 2006-07. The main purpose was to develop a catalogue of landraces. Ironically, the starting points itself was very challenging. Same variety was known by different names in different places and different varieties were known by the same name in different places. During the cataloguing, one of the primary concerns was **‘naming and characterization’**. Mr Chakradhar Panda and Dr SR Dhua drew up a classification protocol by which they could distinguish different varieties and avoid duplicates. Following the principles of Protection of Plant Varieties and Farmers’ Rights Act (PPV&FR Act 2001), these samples were labelled against the farmer who shared these samples. A grid of 6 characteristics was developed to sort out the seeds collected during the cataloguing. After this survey, Department of Agriculture realized that there are 1250 varieties of local landraces of paddy with the farmers. These details were documented for each participating block of the state.

After an initial mapping, the next step was to register the local varieties with PPV&FR Authority. Since there is a huge diversity of local landraces, Mr Gopalan thought that all these varieties should be formally registered. As part of this registration process, DUS characterization (Distinctiveness, Uniformity and Stability) of each landrace is required. This is not an easy task, when the inventory/ catalogue already has 1250 varieties of seeds. This process demanded the availability of viable seeds with certain quantity (for conducting various tests and determining the characteristics) and making available at least 100 panicles of each accession to the Authority for enabling preservation for the next thirty years. It was necessary to ‘produce’ each landrace to ‘purify’ it and isolate it from any possible contamination/ admixtures (with other varieties). After segregating the purified version, conducting of DUS characterization is a necessary condition for seed registration.

Department of Agriculture, GoO approached Odisha University of Agriculture and Technology (OUAT) for taking up this task. However, OUAT declined to take up this task, as they did not have enough human resources to deploy for this huge task. Department of Agriculture had to then find a solution that is acceptable to the scientific world and that could withstand the rigors of scientific scrutiny. RS Gopalan took a bold step of partnering directly with farmers who could work under the close supervision and support of NGOs working with those farmers, and who have expertise on agriculture issues. 19 NGOs were carefully selected from each agro climatic zone of the state, as partners in this initiative. Dr SR Dhua and Mr Chakradhar Panda conducted series of training programs to the NGO staff and lead farmers, who became active partners in this initiative. These farmers and their associate NGOs could produce the seeds by maintaining an isolation distance, and adopting other required protocols, and supplied the same back for further characterization. These NGOs and farmers could perform these tasks with high level of technical expertise, scientific rigor and accuracy, surprising many skeptics. One acre was chosen for about 20 varieties. About 1000 varieties were thus cultivated in the farmers’ fields. Such processes are rarely conducted on farmer’s fields, in India. This entire process was funded by grants from Rashtriya Krishi Vikas Yojana, a centrally sponsored scheme, to an extent of about 13 lakh rupees. The cost of the entire operation was reduced to a large scale compared to the estimates provided by OUAT.

An important scientific understanding underpinning the characterization effort in farmers' fields is that traditional varieties have endophytes and this means that it is important to grow them in areas where they originated.



The State Seed Testing Laboratory (STTL) where Mr Panda worked, had codified all these varieties and distributed the seeds back to the NGOs (on the basis of their origin). Based on the training inputs and newly acquired skills, these NGOs and farmers could cultivate these landraces in the most purified manner and conducted DUS characterization of the seeds which were collected from their respective blocks. Apart from this, they could also supply required quantity of seeds (without contamination) and 100 panicles of each variety, to the department. One set of seeds was grown at farmer's fields in different sites under the supervision of NGOs and another set was cultivated at CRRI/NRRI. These seeds were used to track what was growing at what time and also as a validation process.

These 19 NGOs were ISWO (Dhenkanal - 47); Samaj Seva Sansad (100); AID (Khurda - 21); CARR (Cuttack - 103); Orissa Krushak Manch (40); YCDA (Boudh - 20); KARTYABA (Kalahandi - 96); ONSSKS (CTC - 40); SIPRA (CTC-40); USTHARGA (Jagatsinghpur - 15); Harsha Trust (Rayagada - 45); Shiva Krupa (Jhint Sasan - 35); Sourabha (Sahidnagar - 20); Agency for Social Action (47); Raj Kanika Sahitya Sansad (Udala - 49); Pallishre (Khurda - 76); Gram Swaraj Baripada (51); Sundergarh Gramya Unnayan Pratisthan (Sundergarh -40); Ahinsa Bargarh (12).

By then, the Department of Agriculture had a catalogue of landraces, purified seeds of required quantities, 100 panicles and DUS characterization notes. This entire process was completed in collaboration with CRRI, STTL, NGOs and farmers. This process was undertaken in the real agriculture fields and by farmers themselves, with support from NGOs, agriculture department and public sector scientists.

In this process, there were few scientific protocols that created ethical questions on the ownership of the seed. Seed testing protocols are associated with high level of scientific rigor and standards. Though testing standards allow a certain percentage of variability, too much of variance is not allowed. In case of most of the landraces, these varieties cross the allowed levels/ limits of variability. So it is not possible to certify them scientifically. These tests are mainly for germination and genetic purity. It is common knowledge that current seed stocks of most of the landraces do not have high level of genetic purity. Even with Keonjhar *Kalachampa* the variability range was too high. There was a need for further purification. It is not feasible to register the purified seeds as a "farmer's variety", as the genetic identity of the purified one was slightly different from the original version (which is found in farmer's fields). In this case, Keonjhar *Kalachampa*, which had an awn, became "*Kalachampa*" without an awn. While there is a practical need of purifying the indigenous seed to the extent possible and also an ethical question of preserving the original characters/ nature of the seed (without changing its original gene structure), a process was followed to achieve the twin goals. The farmers' varieties went through a process of pure-line selection. In this process, a conscious decision was taken to register these varieties with the names of the farmers, who originally supplied these seeds. For multiplication, as far as possible, the original farmers were selected, and they were requested to multiply and provide.

As a commitment to this philosophy of conserving native germplasm with farmers' names, the Department of Agriculture, Government of Odisha established two Gene Banks (one for medium term storage @ 4 degree centigrade with 33% RH & another for long term storage @ -20 degree centigrade) at State Seed Testing Laboratory, Bhubaneswar under State Seed Testing Laboratory (SSTL). Rs 4.5 Crores from RKVY were used to establish these facilities in 2013 and 2017. At present 1150 number of farmers' paddy varieties and 100 non-paddy varieties are conserved in these Gene Banks. 3 to 5 kg of seeds are stored for each landrace of paddy and 250 gm to 1.5 kg of seeds are stored in case of non-paddy crops. These seeds are considered to be deposited in 'safe hands' for access in future, for any restoration of the original genetic variety. These deposited seeds could be used to restore the selections made in case of unexpected losses due to natural calamities. Farmers' consent is necessary for any further use of these seeds for research purposes, having been registered under the PPV&FR Act.

SOME NOTABLE FEATURES OF THE *KALACHAMPA* STORY

- It is an initiative of the agriculture extension system and not the agriculture research system
- It used a unique partnership between the agriculture department of a state government, interested farmers, local civil society organizations and an ICAR institute as its beginning point
- Breeder seed maintenance is being done to this day by the State Seed Testing Laboratory, an unlikely agency for this role!
- It chose to register many farmers' varieties for protection against biopiracy under the PPV&FR Act, but has now thrown up newer challenges of certificate-holding-farmers' authorization for other registered varieties to be multiplied and distributed in formal seed supply system
- It went through the conventional varietal release mechanism at the state level with the State Director of Agriculture as the Chair of the state seeds committee (whereas in the normal course, this would consist of multi-disciplinary teams of agriculture research scientists including the Chair)
- In the end, the *Kalachampa* that is in the formal system is not the same as the farmers' landrace i.e., Keonjhar *Kalachampa*; as the current varietal release systems do not allow for traditional varieties to be registered in their own merit.

Kalachampa brought into Seed Supply System

While the above processes with regard to conservation and varietal registration of many traditional varieties were underway, *Kalachampa* variety of paddy got the attention of SSTL staff and Department of Agriculture. *Kalachampa* is a 150 – 160 days duration crop, with high yield potential. It exhibits moderate resistance to biotic and abiotic stress. This is already popular among the farmers. SSTL found that Keonjhar *Kalachampa* was an awn-variety. During pureline selection, a line without an awn was obtained, which was multiplied by giving it to farmers again. It was found that the traits of this new variety had very large similarity to Keonjhar *Kalachampa*, except for the awn, and it was already available with the farmers. This variety *Kalachampa* went through a process of pureline selection; the genotype was not created but it was a selection made in farmers' variety to create a pure seed-line. The Department of Agriculture conducted multi-locational testing with this variety across the state. The variety performed very well. Based on the positive results and observations from the field, the Department of Agriculture desired that this variety *Kalachampa* be released into the formal seed system through a formal notification. This notification enabled the process of supplying this variety of seed to farmers, by Department's extension system. Inclusion of this seed variety into the formal seed supply system held the potential to transform the lives of farmers in all parts of the state.

It is interesting to note that the current system and process of approval/ notification was designed for agriculture universities and private parties. The varietal release system is mainly used by them. Since the university or private companies are not involved in this case, Mr Gopalan, to cut down the entire administrative process, put Director Agriculture as 'breeder' of *Kalachampa* variety and got it released through the formal system. The discussion went to the state level seed committee where he explained the entire process, and got it approved. It took him nearly 2 years to put *Kalachampa* into the seed system.

Was PPV&FR Registration Essential?

The Department of Agriculture took a longer route of registering all varieties after scientific characterization. As per the PPV&FR Act, the certificate holder of a variety that is registered has to be paid by others, if the registered variety is to be commercialized by others. Importantly, it also requires an authorization from the certificate holder. Since PPV&FR Act does the registration on a first-come, first-served basis and also registers the variety in the name of one individual farmer (earlier) or a handful of farmers, the entire process becomes antithetical to common property regimes (where it is difficult to pinpoint a single person as the custodian of the seed), or open-source regimes where no one is allowed to claim any exclusive rights. To prevent any bio-piracy and cornering of profits from community's resources / knowledge/ traditional practices by private commercial interest groups, it was felt that it is essential to follow the legal framework prescribed in the PPV&FR Act, and get the farmers' varieties registered. However, for release of a variety in the formal seed supply system, registration with the PPV&FR Authority is not a pre-requisite. During the registration it was clear that any income generated from the registration will be shared by farmers from the area. However, in hindsight it is now clear for even the protagonists in the *Kalachampa* story, that the varietal registration under PPV&FR Act which is equivalent to ownership rights under an IPR was not enough though the same testing plots and data generated were used for state seed committee clearance and notification.

Kalachampa gets distributed in formal seed systems in Odisha

SSTL took the responsibility of producing breeder seeds of *Kalachampa* since 2016, after its formal recognition/ notification. In 2016, it was 11 Quintals; 2017, 20 Quintals; in 2018, it increased to 32 Quintals and in 2019, it was 52 Quintals. These breeder seeds are supplied to Odisha State Seeds Corporation for production of foundation and certified seeds. Now *Kalachampa* variety is in the formal seed chain system. Odisha State Seeds Corporation has supplied around 20,000 Quintals of *Kalachampa* certified seeds to the farmers of Odisha through DBT sale during kharif 2020 and 30,000 quintals of *Kalachampa* certified seed through DBT during kharif 2021. One can see that the demand for these seeds is increasing year by year.

It is normal to see initiatives on bio diversity and seed conservation in NGO circles, a few academic institutions and also amongst seed conservator farmers. However, what happened in Odisha is not normal.

Agriculture departments are burdened with several schemes that they have to implement. Taking up the agenda of seed conservation and establishing entire institutional arrangements, protocols and infrastructure facilities is very rare for state agriculture departments. The unique and pioneering efforts made by Department of Agriculture, Odisha are noteworthy. These efforts have found several pathways that led to enhanced facilities for seed conservation and productivity at farm level. These efforts were recognized by Government of India and accolades followed. The Director of Agriculture and Food Production, Government of Odisha was felicitated twice by PPV & FR Authority, Government of India during 2011 for highest number of landrace varieties that were registered.

While the Department of Agriculture, Government of Odisha received the accolades, which is most appreciable, the real winner is *Kalachampa* which could be distributed to a large number of farmers through state-supported investments. Farmers who preferred landraces could look forward to more such seed varieties, which have huge promise, for their future.

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