

Traditional Agricultural Knowledge & Agricultural Practices

Under the Mahila Kisan Sashaktikaran Pariyojana, the Centre for Advanced Research and Development has undertaken the documentation of traditional agricultural intercultural operations in the Mandla and Dindori districts of Madhya Pradesh. This exercise has only been carried out in a total of 3 blocks. Women farmers have been interviewed at various times during the last year and below are the compiled results of these findings. The results have been presented with respect to various crops.

Paddy

1. Land preparation

Operations:

Cleaning of land: Land is cleaned and cleared by shifting the paddy straw of the previous monsoon season to some place for storage. This does not hold true for all farmers but only for those who do not have sufficient space to store straw in/ near their residences. Clearing of land is followed by light ploughing.

Ploughing and harrowing: Farmers interviewed in nearly all villages have reported that they undertake ploughing with a wooden blade and harrow in the months of April and May. In Hindi, the plough is called nangar and the harrow is called bakhar. This helps to expose the first 6 inches of soil to the harsh summer sun. Some farmers report that they ploughing is almost a foot deep. Ploughing is carried out to break the hard pan and creation of fine tilth. Ploughing is not very effective for weeding. Harrowing of land helps to eliminate weeds. The villagers here take complete advantage of summer temperatures that reach 44°C. They are aware that the heat will kill insects, larvae and pupae living in the soil and it also helps in destroying weeds. Some farmers delay ploughing till the last week of May.

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Cost: 2 hour for INR 800 for tractor and the land area covered is 1 acre.

Bullock: 1 acre 2 days and each day costs INR 300. Bullock ploughing leads to better aeration of soil as tractors lead to compacting. Farmers use their own bulls or bullocks. They occasionally hire bulls.

Manuring: Application of decomposed and partially decomposed animal excreta (droppings of cows, buffaloes and goats) is carried out in the first week of June. This is broadcasted on the land with the help of baskets by women farmers and it was reported that most of the family is involved in 'gobar'

application. It stays on the surface and is not incorporated in the land. If the farm is at a distance from the residence, then tractors are used for transportation. Urea, DAP and SSP application are very common amongst the farmers of the Mandla block whereas in the Ghughri block, few farmers use urea and this came into use around 20 years ago.

Timing: Most farmers stated that ploughing, harrowing and FYM application takes place 15-20 days before the estimated date of sowing.

2. Sowing:

Method of sowing:

Paddy: The farmers alternate between transplantation and broadcasting of seeds. The decision for broadcasting or transplanting depends upon land quality and rainfall. For e.g. as the rains have arrived early this year (June 2013), they cannot opt for broadcasting and nearly everyone will be transplanting rice. The early arrival of monsoon means that there has not been enough time for land preparation and therefore they cannot broadcast the seeds as they will be left lying on top of the soil and may not germinate properly. Generally, low quality land such as the one with skeletal soil sees more broadcasting of paddy seeds and better soils such as the black soil sees more of transplanting.

Broadcasting: This commences in the 2nd week of June. Paddy is broadcasted after maize. In years when the rains arrive around the 15th of June, farmers broadcast their seeds after 2 – 3 good showers of monsoon.

Transplantation: More plants are put in the field via transplanting. Transplanting is done when the nursery is around 15 to 20 days old.

SRI – They have been doing SRI for the last year. SRI requires lesser number of plants in the field as compared to transplanting. Family and social opposition is high towards SRI. SRI transplanting is done when the nursery bed is around 10 to 12 days old. Saplings don't rot in the nursery bed and removal of plants is easier.

Comparison: SRI is better than transplanting which is in turn better than broadcasting.

3. Seed selection:

Ghughri and Dindori blocks: They decide which seed to sow on their own. Sometimes they receive advice from the Agriculture Division and at other times, shopkeepers who sell agricultural inputs. The gram sevak also advises farmers about the varieties to be sown and so does the RAEO. Those who have the money to buy the newer varieties, heed their advice. **Mandla block:** They do decide which seeds to use on their own and also rely on government agencies. Also, about 10 years ago, a seed company had promoted new varieties. About 3-4 another marketing campaign had also given awards as per the rate of adoption.

Mandla block: Many farmers stated that hybrid seeds cost more and give higher yields. Prices of hybrid rice are only 2-3 rupees higher than that of indigenous varieties. They prefer desi seeds. They avoid consuming hybrid rice as it is tasteless.

A popular variety of paddy is 'luchai'. This is a long duration variety along with 'Urai boot' and 'Nunga'. A sixty day duration variety is called 'sathiya'. Not many of them have carried out seed replacement. Some farmers have started using MTU-1010 and IR-64. MTU 1010 and IR-64 were introduced in this area by the Agricultural department 2 years ago.

Paddy varieties in use are as follows:

Long duration: Urai boot and luchai that are planted in heavy and deep soils.

Short duration: Jharai, jhalar, sathiya (60 days long) and nunga.

A variety named 'Vishnu Bhog' is scented rice that needs heavy farmyard manure application to give proper results.

4. Seed treatment

No seed treatment is carried out.

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5. Seed germination

- a. **Gopana:** Paddy was tied up in a wet cloth and buried in the ground for 8 to 10 days
- b. **Lei:** Paddy seeds are kept in water overnight and then drained. They put them in a basket and this is sprinkled with hot water. It is then covered with leaves of the Flame of the Forest tree or a gunny bag. This paddy is again drenched in water for one more night. This sprouted paddy is used for transplanting or broadcasting. This prevents bad seeds from being sown in the ground.

6. Nursery bed preparation:

Paddy: A nursery bed is called 'khar'. There are no fixed measurements for the bed and it depends upon the land holding and the availability of water. A traditional way of fertilizing the nursery bed has the inculcation of 'Palash' (*Butea monosperma*) leaves in the bed. The foliage of the tree is laid on the ground to dry in the sun and is later burnt. This ash is incorporated in the nursery bed as it leads to better germination. It also helps to remove the paddy saplings from the bed without damaging the roots. In the absence of manures and fertilizers, palash leaves' ash is a good fertilizer. No cow dung is used due to the fear of weeds and if they ever use cow dung, then they ensure that it is perfectly rotten cow dung.

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Paddy from the smaller beds (dimensions not specified) are ready planting earlier than those from larger beds. The plants have to be about the height of the fist of a man with the thumb extended (4 inches) before they are uprooted for transplanting onto the field. Instruments used are 'kudari', 'gaiti' and 'hasiya'. The hasiya is largely used for pressing seeds into bed.

Preparation time: A nursery will be ready in 15-20 days. In the absence of rain, this period is extended by 1 month.

Transplantation sans nursery bed: Sometimes a nursery is made but it is not elevated. The paddy seeds are broadcasted in a rectangular area in the field.



Scattered paddy seeds that have not been pressed into the ground.

They are then covered with Palash (Flame of the Forest) leaves so as to protect them from 'chiraiya' i.e. all warblers. Palash is also called as 'chivala'.



The nursery covered by Palash leaves.



Here we can see that a part of the nursery is yet to be covered by Palash leaves.

7. Weeding

Hand weeding is carried out by women. Weeding starts when the paddy crop is about a foot tall. Around 4-5 women work for weeding one acre of crop. The time for weeding one field (one acre) is anywhere between 15 days to one month. Sometimes, they hire labour. A labourer is paid INR 100/day. If they are paid in kind, then it is 2 kudas of grains per day per person.

Basiya: This method involves ploughing in the field after the crop is standing. For this, they carrying out dense sowing and when the crop is about a foot tall, they plough the field so as to incorporate the weeds into the soil and to reduce the density of the paddy crop. This comes a little close to reaping the benefits of line sowing.

Variety for weeding A paddy that is the colour of henna or in Hindi 'kathai' coloured is preferred when the farmers are interested in carrying out proper weeding. It helps to distinguish between weeds and paddy plants in the field.

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8. Use of industrial and non-industrial fertilizers

Manures

Types: Rotten cow and buffalo dung, paddy husk and paddy straw.

Quantity: 5 bovine animals are able to supply 2 trolleys i.e. 2 tonnes. 1 to 3 trolleys (1 to 3 tons) of decomposed cowdung is added to per acre of cropland. There is no purchase of farmyard manure.

When: Dung is scattered on the fields as and when they run out of space to store it but this is done on larger quantities before the onset of the monsoons.

Method of application: Broadcasting

Chemical fertilizers

Types: Urea, Di-ammonium phosphate (DAP) and single super phosphate (SSP)

Quantity: None. Those who have enough money before the monsoons buy in quantities that are dependent on their purchasing power. The point of purchase is the local Agriculture department.

Cost: INR 500 per bag of urea.

When: DAP is added to the soil at the time of puddling (in case of paddy). SSP is added at the time of transplanting.

Method of application: Urea is added at the time of sowing and after weeding is done with. DAP, SSP (1 bag/acre) and zinc (5kg/acre). Everything is purchased from the society. Everything is used as per need. Urea is added at the two-leaf stage. DAP and SSP is added just before sowing and then they carry out the puddling of the field.

9. Irrigation

No irrigation is carried out as many farmers reported that they have no wells and no other means of water supply. There are very few people who have diesel pumps and even those are used for pumping water from wells not from streams or a river. Even if they have wells or if their fields are close to sources of water like streams or rivers, many farmers lack the machines for carrying out irrigation. Their cultivation is completely dependent on the monsoons.

10. Pest control

Ghughri and Dindori blocks: No action is taken against pest attacks as they are unaware of the chemicals to use, there are no stores that sell pesticides and insecticides in the stated area and neither do they have the financial resources to purchase these chemicals. Non-chemical means of insect control include the scattering of ash on the crops.

Mandla block: Insects: Katar (Army worm) – There is an insecticide for a condition called katarni. One bottle (shishi) is used in one acre. They were unaware of the name. It costs about INR 400 to 500 rupees. It has been reported that urea application has led to insect attacks as earlier there were none.

11. Test of Maturity

Farmers check paddy panicles for maturity. The turn ripe and change colour from green to yellow. They also check for sound. When the wind blows, the grains make a distinctive sound that indicates

that the paddy is ready for harvesting. The exact statement was 'झरा झरा आवाज़ आती है'. The panicle is filled. The hair of the paddy starts bending downwards and the plant shows signs of drying. Sowing takes place in the Hindu calendar month of 'Ashad' and the test of maturity is done in the Hindu month of 'Kartik'. IR-64 is ready for harvesting in 90 to 95 days and Luchai is ready in 120 days.

12. Harvesting

Implements used: Hasiya (sickle) is used to cut paddy. No machines are employed.

Time and labour: Paddy harvesting requires 15 man days per acre.

Output: Paddy – haruvan paddy gives a total of 3-4 bags per acre. That is, 2.5 qtl/acre. Garuvan paddy (Luchai) gives a total of 10 bags/acre i.e. 6 qtls/acre. In some places, the yield touches 8-10 quintals per acre in a good harvest.

Labour requirements: The whole family (4-5 members) participate in the harvesting process. If labourers are hired, the payments are made as follows –

- i. Paddy: Rs. 2000 per acre
- ii. In kind: 3 bags of paddy/ acre

Implements: The hasiya is used to harvest the crop.

Manpower and cost: The whole family participates in harvesting. 2 to 4 labourers may be hired and they are paid about INR 100 per acre. If payment is in kind, then the worker gets paid 10 kgs. Sometimes cooperative work is carried out. This is called, "आपसी अदला बदली में जाना. " In this case, no monetary compensation is offered

13. Threshing and storage

After harvesting, the stock is stored in a round, smooth vessel. This is called the 'khali'. After threshing, the grains are stored in a big vessel made out of soil. Threshing is carried out by animals. 2 people get the animal to walk over the harvest and 2 people do the 'उडाई'. This is the work of dropping the grains from a height when the wind is blowing. If they hire labourers for this task then they do not need more than 2 to 3 people.

14. Post-harvest losses

In paddy, 2-3 kilos are spoilt per quintal. This is a guesstimate. Some other farmers reported that around 10% of the produce is lost while transporting from the field to the house.

15. Sales

Transportation: Ghughri block - Stock is sold in Ghughri. Transportation is by means of autorickshaws and cycles. Earlier, they used to walk 8 kms to Ghughri and they would carry stuff on their shoulders.

Quantity: The quantity of goods sold rarely exceeds 1 to 1.5 quintals. Some farmers said that they often do not sell more than 8-10 kgs.

Time of sale: The sales commence in the Hindu calendar month of 'Phagun' or to gain some money for events like marriage.

Selling price: Paddy is sold @ INR 6 or 7 or 8 per kilo.

Buyers: Local traders.

Storage: Most stock is stored. They could not provide exact details. Maximum consumption is for food requirements.

When is stock sold? Distress sale only or when they want to buy vegetables.

What are the techniques for preventing losses during storage? Most farmers responded none whereas very few said that they sun-dry the grains and some said that they add boric powder to it.

Maize

1. Land preparation

Maize is exclusively sown in skeletal soils that are called 'barra zamin' in Hindi. Maize is planted in the 'wadis' or gardens. For further details, see land preparation under paddy.

2. Sowing

Maize is broadcasted in the field. The farmers have reported that they have never practiced line sowing for maize and it is only recently that they have received training (if any) for line sowing of maize. Maize is sown immediately after the first showers of rain in the month of June. The seed rate for broadcasting maize is around 8 to 10 kgs per acre.

It is under the Mahila Kisan Sashaktikaran Pariyojana that farmers have been trained for line sowing of maize. The recommended spacing is 23 cms X 60 cms. The seed rate for line sowing of maize is 5kgs.

Some farmers have, for the sake of convenience, taken to sowing the seeds in the lines traces by the plough. While this does not respect the ideal spacing for maize, it definitely creates more space amongst the plants as compared to broadcasting. Plus, this makes weeding easier.

3. Seed selection

Indigenous maize is used for planting and very few buy it from the agricultural department. A popular variety is called the 'Safed'. The actual name is 'Ganga Safed' which is a 30 year old

variety. Another popular variety is called 'lal makka' i.e. red maize. In the Mandla block, women farmers reported varieties named Chandan 1 and peela makka (yellow maize).

4. Seed treatment

No seed treatment is carried out for disease prevention. However, it is to be noted that seeds that are bought at the agriculture department are pre-treated with chemicals.

5. Nursery bed preparation

This is not applicable for maize cultivation

6. Weeding

Weeding in the maize field is carried out before that in the paddy field. Refer to weeding under paddy for further details. It takes nearly 15 days to 1 month to carry out weeding in a maize plot. They have never applied weedicides in the fields.

7. Use of chemical and organic fertilizers

Refer to the same under paddy.

8. Irrigation

Cultivation is completely rain-fed.

9. Pest control

Refer to pest control under maize.

10. Test of Maturity

The size of the corns is used to determine if they are ready for harvesting. Another indicator are the leaves. The leaves go from green to yellow.

11. Harvesting

Refer to harvesting under paddy. The same implements are used for harvesting maize. The corns are used for human consumption and the leaves and the stalk is used as animal feed. Maize harvesting requires 4-5 people for one acre and the time required is 2 days. The output per acre stands at 3 -4 bags per acre. At times labour is hired for harvesting and they are paid INR 500 per head per day.

12. Post – harvesting losses and storage

Some farmers could not even provide rough estimates of the losses whereas others stated that the post-harvest losses stand at 1 to 1.5 bags per acre for paddy. For storage, the corns are hanged from the beams near the roof or on the walls for usage as shown in the image below. Some of the stock is set aside as seed for the following year.



The other way of storage is to separate the corns from the stalks.



Corn separated from the maize stalk and stored in gunny bags

13. Sales

Approximately 30 kgs of the total stock is sold of the total stock. Maize is sold @ Rs. 10 to 11 per kg and some farmers stated that it is sold @ INR 5 to 6 per kilogram.

Niger, Kodo (*Paspalum scrobiculatum*) and Kutki

1. Land preparation

These crops are only cultivated in skeletal soil. The land is never ploughed deeply as the seeds will not germinate into plants if they are sown 4 to 5 inches deep in the soil. The seed is not to be sowed more than 2 inches deep in the soil. Harrowing is carried out in the month of July. The land is lightly harrowed so as to kill weeds that grow after the showers. The objective is to destroy the roots of the weeds. Difficult weeds are manually removed.

2. Crop cycle

Niger – Kodo - Kutki

This 3 year long crop cycle balances the strengths and weaknesses of each crop to the optimum benefit of the farmer. In the first year, they cultivate niger which is called jagni in Hindi. Niger helps in weed elimination as it grows vigorously and helps suppress weeds. Niger sheds most of its leaves while it is still standing in the field. These dead leaves in turn help to increase the humus content of the soil. In the 2nd year, this enriched soil is prepared to raise the kodo crop. Kodo has deep roots and a longer life cycle as compared to kutki. Kodo is an exhaustive crop and hence in the 3rd year, kodo is followed by kutki which has low nutrient and water requirements. Moreover, the life cycle of kutki is shorter than that of kodo and it has a shallow root system.

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3. Sowing

The sowing of all three takes place around the 15th of July every year. They broadcast the seeds. This is done when the soil is wet and they do carry out a light ploughing before sowing so that the soil is aerated at the time of sowing. The seed rate is 60 kg per hectare. One kuda is 5 kilos and farmer have reported that they sow 10 to 12 kudas i.e. 50 kgs to 60 kgs.

In the year when they are sowing kutki, the seed rate for the crop is 6 to 8 kudas per hectare. This amounts to 30 kgs to 40 kgs per hectare.

4. Seed selection

They use indigenous varieties only. There were no specific varieties for niger, kodo and kutki. If they ever procure seeds from the agriculture department, then those seeds are the ones that have been developed in Dindori.

Kodo seeds are often mixed (naturally) with the seeds of Amarmel (a weed). Amarmel seeds are yellow in colour. They try and eliminate yellow seeds from kodo seeds so as to reduce the incidence of weeds. They prefer to sow heavier seeds as compared to lighter ones.

5. Seed treatment

None

6. Weeding

None

7. Use of chemical and organic fertilizers

None.

8. Irrigation

Cultivation is completely rain-fed.

9. Pest control

None.

10. Test of maturity

The crop goes yellow from green.

11. Harvesting

Harvesting is carried out with the help of sickles. The crop (Niger/ Kodo/ Kutki) is harvested in the monthS of November and December.

Benefits of Kodo cultivation

- ❖ The seeds of kodo do not go bad for 40 years and can be safely stored for that long.
Compared to kodo, wheat and rice are go bad in 2 years.
- ❖ Kodo helps combat cough and cold.
- ❖ Thanks to kodo and kutki cultivation, lands with skeletal soils do not remain fallow.
- ❖ It is far less expensive and more remunerative as compared to paddy cultivation.

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Others:

Sowing of kodo, kutki, rai, jagni (niger) and tilli is carried out after the sowing of maize and paddy is complete. They did not specify any varieties. They only stated that they sow *lal kutki* and *kali jagni*. The seed rate is 6-7 kilos per acre for kodo, kutki, rai and jagni. All of them are broadcasted on the fields

What is sold and how much? Paddy – approx. 8 to 10 kgs. **Price:** Paddy @ Rs. 9 per kilo, gram @ Rs. 25 per kilo. Pea (batari) @ Rs. 17 per kilo and batari @ Rs. 20 per kilo. Linseed – approx. 3 kgs. Wheat – Not much.

Annex 1

List of seed varieties that are currently were earlier popular and are now going out of use.

Seed varieties that were earlier in use and are now becoming rare or are not in use:

1. Yellow Luchai is becoming rare (10% farmers use it)
2. Right now in use – Moti luchai and choti luchai
3. Badarum phool – a scented variety (They stopped using it about 8 to 10 years ago.)
4. Dubaraj – Scented smaller seeds (8 years ago they stopped using it) – They want this one back
5. Jeera Shankar – Only being sown in Bicchiya. No longer in use in Mandla block
6. Ama gohi – Scented, small seeds
7. Jeerankhi – Long variety
8. Nungi – Sold for making poha
9. Sorane – Thick seeds
10. Rani Kajal – Thick seeds used for poha
11. Gol matiya – Thick seeds
12. Sarsari – Thick seeds (High incidence of scattering)
13. Suvarna – Medium quality seeds used for food. Long duration variety. Tasty.
14. Parvati – Thing, long paddy. Very tasty.
15. Chattri – Thin, scented paddy
16. Heera chaholi – Very tasty and thin paddy
17. HMT – 10 to 15 year old variety. Tasty, soft and thin grains.
18. Mahamaya – Think grains, poha creation

Newer varieties

1. 6440 – Good yields
2. Parvati – scented
3. Rabina
4. Rabina 6201
5. 2020 – poha
6. 401
7. Champion
8. JK 401
9. 9090 – Thick paddy (thin, thick and long sub-varieties)
10. MTU 1010
11. IR 64
12. Supreme Sonam
13. Sudha
14. Sakhi
15. Yashoda Gold
16. Shriram

17. Gayatri
18. 312
19. Winner
20. Shankar
21. Ganga Kaveri brand
22. Kranti – Thick
23. HMT Sonam

Varieties that farmers said they want back	Characteristics	Duration
1. Dubaraj	Scented, small, soft High market value. They want it back	N/A
2. Bada Luchai	Sweet and is used for food consumption. Requires less water during the crop period.	120 days
3. 6440	High water demands. Good yields	120 days

Ghanajeevamrutam – Organic manure

Method of preparation

1. Take empty plastic or steel containers



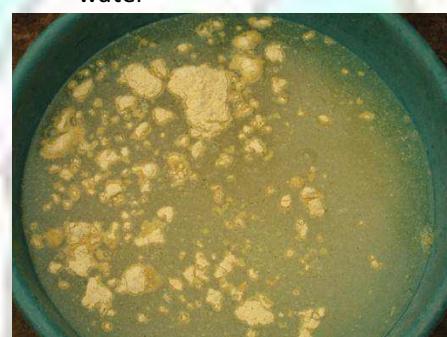
2. Add water to the containers



4. Add jaggery (500 gms) to the flour and water mixture



3. Add gram flour (1 kg) to the water



4. Now mix everything well



5. Add cow dung and cow urine and mix well.



Keep it for 48 hours. Use by mixing in 100 liters of water i.e. one drum of water.

Prepared with the help of Ms. Shivrati Parate, the Village Level Resource Person in village Gwara, Ghughri block, Mandla, MP