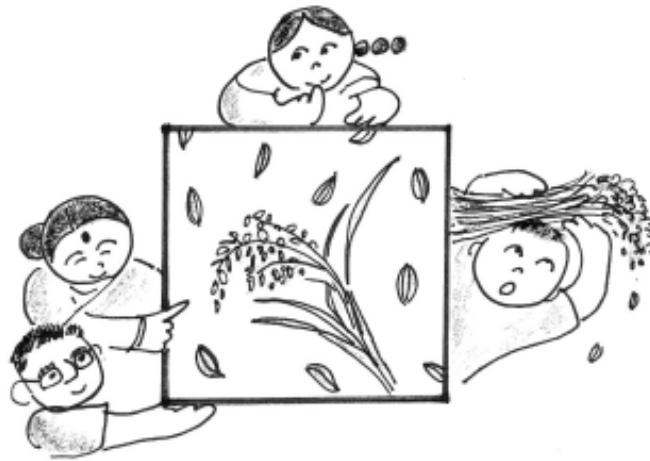


Creative Lesson Plan on

# Rice



for teachers, educators and community workers

ENRE

Ecology and Natural Resource Education  
Development Research Communication & Services Centre

**'Creative lesson plan on Rice' (Selections from 'Basbhumi' : booklet - 6)**

Project Coordinating & Concept Development : Ardhendu S. Chatterjee

Lesson Plans Design, Illustration & Editing : Satoko Chatterjee

Content Review : Ardhendu S. Chatterjee, Anshuman Das

Translation & processing of feedback data : Sanjib Chatterjee, Satoko Chatterjee, Malabika Saha

Feedback from teachers and children of ENRE network :

Samir Biswas, Sudip Kumar Mondol, Fazlur Rahman, Abul Kalam, Kankar Kumar Gain,  
Subhankar Bhabuk, Tarun Mondol (Swanirvar), Debasish Panda, Sek Jobok Ali ( Kajla  
Jana Kalyan Samiti), Arun Kumar Shai, Atanu Kundu (Vikramshila - Bigha)

Composition & Layout : Somjita Mukherjee

Cover : Satoko Chatterjee, Abhijit Das

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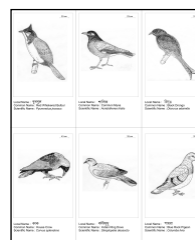
**58A Dharmatola road, Bosepukur, Kasba, Kolkata 700042, West Bengal , INDIA**

**☎ 2442 7311, 2441 1646 E-mail : enre\_sc@vsnl.net**

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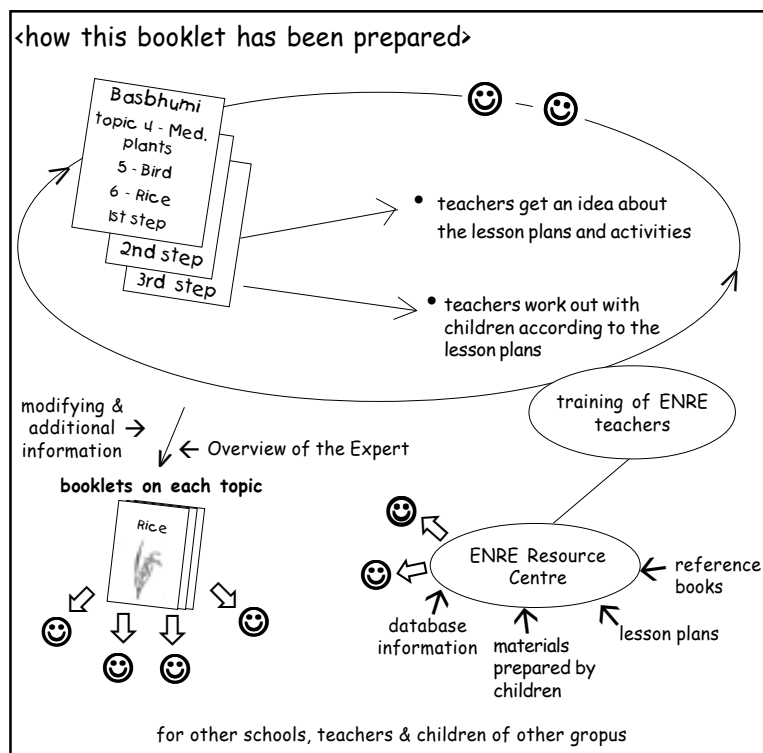
## About this booklet—

All the lesson plans included in this booklet were developed by ENRE team and tried out (and sometime modified ) by the teachers and children’s groups of ENRE network. Originally these lesson plans were provided to a network of teachers as model lesson plans **targeted for the children** of class IV-IX in shape of bi-monthly newsletter ‘Basbhumi (Habitat)’. With the skills of **‘active learning methods’** imparted through our teachers’ training, they have tried out each activity with their students in their class or as extra curricular activity for last 2-3 years. Feedback of these groups made this booklet unique and life related.

12 topics related to Natural Resources and their sustainable management etc. were discussed in various issues of ‘Basbhumi’ (in Bengali). **‘Rice’** is the sixth topic booklet.

We hope this booklet is useful for other **teachers and educators**, as well as **community workers** and even for those **parents** who are actively involved in environmental education or environmental activities in their own local community.

And we shall be delighted if this booklet can help in nurturing the mind & spirit of young generation who can take a key role for caring their own environment and community life.



(Please see page 96 for forthcoming issues)

## How to use this booklet—

- The lesson plans in this booklet are designed step wise (see page 8 & 9). We suggest to try out these activities following those steps, but you can also adapt each core idea according to your local context.

### ***For teaching & learning process :***

- You can get some ideas on how to prepare your own lesson plan promoting action learning.
- You can try out several participatory learning & sharing tools (eg, brain storming, making charts & graphs, mapping, ranking, timeline, data collection, interview, presentation etc. ) for your class.
- You can get ideas on how to connect your class room to local community.
- You can use these lesson plans both for school curriculum and extra curriculum work and obviously you can generate children's interest & enthusiasm on environmental issues and activities.

### ***For community aspects :***

- You can help the children to collect local data on natural resources in their neighbourhood and encourage them to know more about their surroundings.
- You can organize children's group to improve local environment through collective action.
- You can grow community members' awareness on environment through children's activity.

### ***For home :***

- You can try out some of these activities with children in your home during their school holidays. We are sure you can design your own 'home –based' activity for a greener world, because we have already got feedbacks about this.

- In 'reference' section, we have included **expert's view point on the topic** and also have introduced some useful documents. You can get some ideas how community based activity can be related and contribute to global environmental issues etc. and hopefully you can utilize these resources & information to strengthen your capacity of facilitating activities.

The Summary list of rice varieties that have appeared in this booklet is also included (see pg. 77) for your reference.

# About lesson plan —

We wish the **learning process could be more exciting and open ended** rather than 'being hammered by more and more information'.

## What is 'creative lesson plan' ?

We think that good lesson plans should provide the **opportunity of discovering and searching out the fact by the children themselves**. Children can choose their own learning process and context. The teachers only need to facilitate it only rather than imposing an uniform style.

Creative lesson plans should have the following aspects.

- **Starting from what children already know** & what children have experienced / felt; These help to enhance children's interest about the topic.

- **Having the overall goal related to 'Social / Environmental issue' and 'Scientific attitude'**.

For example on the topic Rice, social/environmental goal can be <to make the seasonal calendar of rice cultivation in own area> <to learn about the negative effects of using Agrochemicals in rice cultivation>, and scientific goal can be <to observe the growth of rice by growing own rice> <to learn about pests and beneficial insects in rice field> etc. Setting up these goals helps the children to be aware that they can do something to improve their environment and solve some of the social problems.

- **Including group activity as well as individual activity.**

Through group discussion, planning and activity, children can find out better ideas and solution and also can grow their cooperative attitude and collaborative skills. They can learn to respect other's opinion too.

- **Children can have fun** and relish the moments of discovery in their learning process.
- Children's learning activity should **link their class room and community**. This is essential for Environmental Education, as we need more initiatives for a better environment.

- **Using active & group based learning methods** with children (eg. brainstorming, making charts & graphs, mapping, ranking, timeline, data collection, interview, presentation & sharing skill etc.)
- **Using local materials and examples** for activities. You can make the activity more low cost and eco-friendly by using waste materials also.



*asking good questions  
is much more important  
than seeking answers*

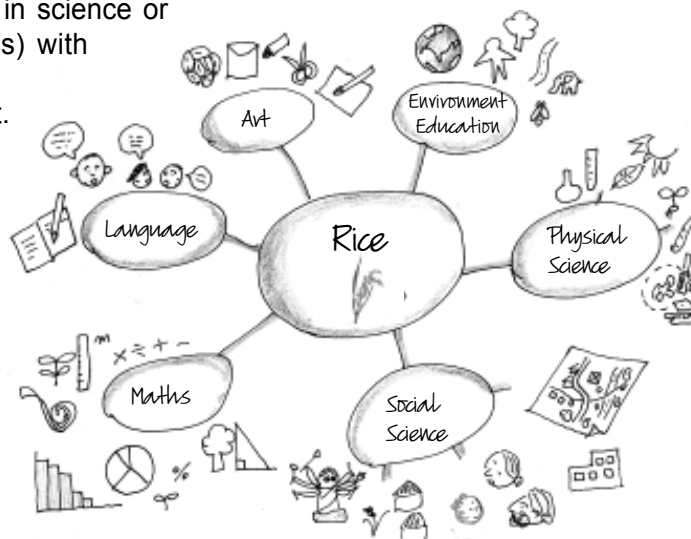


*'Link the classroom  
and community'*

## Curriculum connection

Creative lesson plan has an integrated curriculum approach. This helps you to weave what you are doing in science or EVS (environmental studies) with math, language, social studies, geography and art.

We are getting positive feedback from network teachers that children's interest has increased had certainly shown increased interest to learn other school subjects and develop their leadership abilities after practicing activity-based lesson plans.

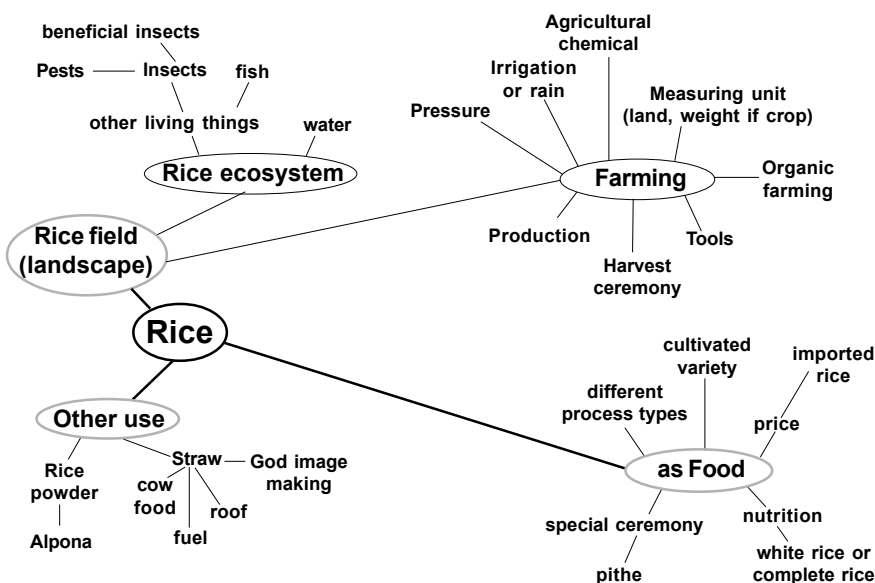


'creative lesson plans' approach can help to increase children's interest to learn and develop a positive attitude.

## How to develop your lesson plan

When you design own lesson plan, we recommend exercising 'Mind Map' as a start. 'Mind Map' is one of useful tool to list up all related points on the topic. You can expand your 'mind map' freely according to the idea which comes in your mind. Later you choose your focus points which you want to work with children in your lesson.

[Example of 'Mind Map'] Usually Mind map has several 'key islands'.





# Rice

## ■ Overall goal

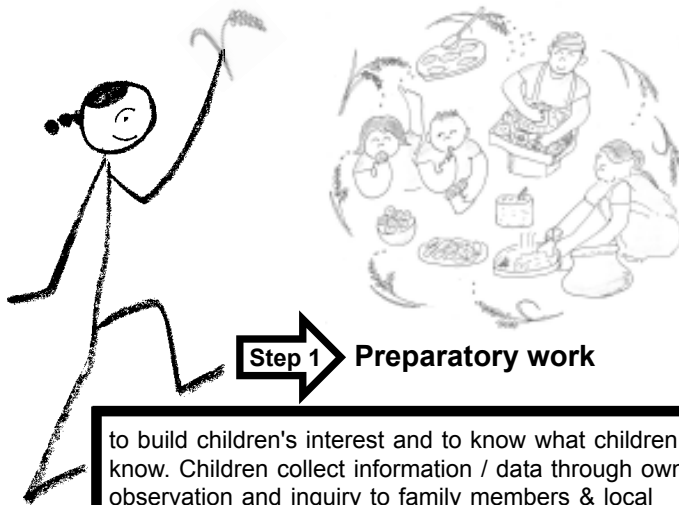
Rice is India's staple food just like many other Asian countries. It is said that 90% of the world's rice is grown in Asia. Rice is one of the main agricultural crop in India.

Nobody can tell exact number of rice variety but scientists estimate that there are 1,40,000 varieties of cultivated rice. Regarding rice variety, India can be considered to be the richest in the world with around 30,000 varieties. But the surprising fact is nowadays 75% of Indian rice production comes from 10 rice varieties, out of 30,000 that existed a few decades ago !

Though a series of activity children are encouraged to investigate rice from various aspects – to know more about rice as food and as other uses, to grow rice by themselves, to meet farmers & interview, to observe rice field and to learn about rice field ecosystem.

Why so many varieties of rice are disappearing? Children should find out the answer & solution.

## ■ Activity Steps



### Step 1 Preparatory work

to build children's interest and to know what children already know. Children collect information / data through own observation and inquiry to family members & local community members.

#### Activity (A) 'Making Rice Farming Calendar'

- listing, interview, summarizing information, making seasonal calendar
- measuring system of land & yield, % (Math)
- 3-4 periods

#### Activity (B) 'Cooked Rice, Puffed Rice, Flattened Rice ..... Investigating Various Types of Rice and Rice Based Products'

- brain storming, listing, collecting information, comparing
- weight and volume (Math), nutrition value, cooking method (Health & Home Science)
- 2-3 periods

### Step 2 Review & Make Sure

To make platform for further activities, to summarize & review preparatory work. make sure Children have learnt  
Encourage childrens to raise further towards finding solutions.

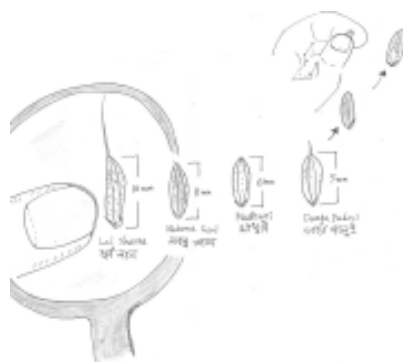


### ■ Changes Expected

- School garden 'Rice field' are created.
- Children can prepare data/booklet on rice in own locality.
- Childrens' effort can help to increase community members' awareness for supporting organic rice farming.



### Step 3 Investigation/Project Work



to create child-oriented activity. Children can apply their collected information into designing studies which are meaningful for the community.

#### Activity (A) 'Let's Grow Rice Organically'

👉 information collection, observation, gardening skill, record keeping, sketching, group work

📖 calculate harvest (Math), rice grow (Science)

🕒 3-4 periods + regular caring

#### Activity (B) 'Rice Farming in Our Village'

👉 information collection, observation, interview, comparing factors, data processing, sketching, group work

📖 calculate harvest / balance income (Math), rice field ecosystem (Science)

🕒 3-4 periods + seasonal observation

arrange a discussion with children  
Put any missing information and necessary points for the next step.  
question and to take initiative

### Concepts and techniques which you can develop in activities

Keywords	Step 1		Step 2	Step 3	
	(A)	(B)	(Discussion)	(A)	(B)
Rice plant (growth stage)			✓	✓	✓
Variety of rice (HYV, Traditional)	✓		✓		✓
Rice based products (food, other use)		✓	✓		
Rice & Nutrition		✓	✓		
Rice Farming Cycle	✓		✓	✓	✓
Rice Field Ecosystem				✓	✓
Organic Rice Farming				✓	✓

## We got feedback from different Organisations —

Even if we all do the same activity, our results could be different, depending on where one lives or the children's abilities. It's quite natural for this to happen. The results that you obtained and data collected which is specific to your locality will become a valuable case study. In this booklet, we will share the feedback we got from different ENRE network groups. You can compare your results with these.

We would like to learn more about the urban school situation & about hill areas from the other groups, since we do not work in these areas yet. So, it would be nice if you would share your experiences.

### Vikramshila group

Bardhaman district

2 teachers are involved in conducting various activities.

This district is located in a gangetic alluvial plane. Agricultural system is mainly rice-based. This region is popularly known as 'Rice belt of Bengal'.

### Kajla group

East Midnapore district

5 teachers & their students conducted the activities within their E.E. school curriculum in 6 villages. About half the children belong to Hindu families and

the rest are Muslim.

The area is located in the coastal area and regularly hit by cyclones. As a result it does not have irrigation facilities.

Agriculture, Small scale industries (handicraft) and fisheries are the main sources of livelihood in this area.

### Chandannagore group

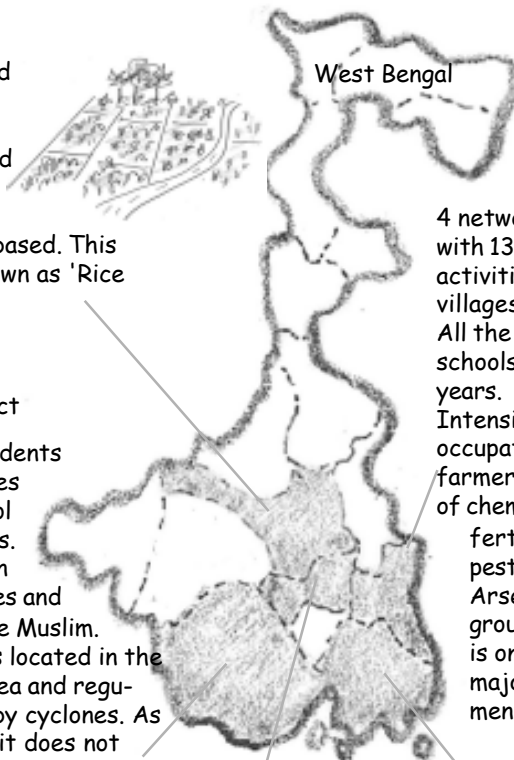
Hooghly district

One of the staff from ENRE team tried out these activities with her children as home-based activity.

Children study in English medium schools unlike the other children in network.

Chandannagore is a small town and located on the bank of Ganga river. Many trees and ponds are observable like in other towns in this district.

Many commuters go to Calcutta everyday by train from here.



### Swanirvar group

North 24 Pargana district

4 network teachers in association with 13 other teachers conducted activities with children in 8 villages.

All the children study in government schools & are aged between 10 & 16 years.

Intensive agriculture is the main occupation of this area and the farmers used to apply large amounts of chemical

fertiliser & pesticide.

Arsenic in the ground water is one of the major environmental problem in this district.



### Ashurli group

South 24 Pargana district

2 teachers conducted activity with 15 children in two villages, Sundarika, Karaghata.

Children study in NGO-run primary schools.

Their area is mainly agricultural land but industrial estate is also located nearby. Villagers earn their livelihood

from agriculture and working in factory.



Step - 1  
Preparatory Work



for growing children's interest



**Lesson Plans**



**Feedbacks**



## Rice

### Step 1 — Preparatory Work — Activity (A)

#### 'Making Rice Farming Calendar'

What kind of help children do in rice farming? Based on children's experience and observation or listening from local farmers, let us make Rice Farming Calendar. The calendar becomes the basic data for learning rice culture in own locality.

[ 🏠 for rural schools 🧑 class 5 to 8 ✎ listing, interview, summarizing information, making seasonal calendar 📖 measuring system of land & yield, % (Math) 🕒 3-4 periods]



#### Objectives

- To grow interest to learn about Rice cultivation system through children's experience.
- To know about children's involvement in agriculture work
- To identify that there are different rice varieties and different cultivation season



#### Success Indication for Proceeding to the Next Step

- Children realize that the availability of water is one of the important factors affecting rice cultivation.
- Children recognize that there are different type of rice like Traditional rice variety and High yield rice variety and each has different cultivation period.
- Children want to know more about how Rice farming system has changed over time.





**Activity**

**Creating interest & motivation**

Ask children whether they help in any agricultural work including rice farming  
(Find out what percentage of children in your group / class are involved in helping their parents in farm work)

Ask children, who help in rice farming, what kind of help they do?  
(Find out how many households in your class are involved in rice farming)

Teachers can help children to summarize their experience like this;

(Example Chart)

	Help Rice Farming	Help Other Agriculture Work	No experience
Girls	6 ( a %)	(%)	(%)
Boys	8 ( b %)	(%)	(%)
Total	14 ( c %)	(%)	(%)
Works children help	• ----- • ----- • -----	• ----- • ----- • -----	

[result from 22 children (12 boys, 10 girls), Class 5]

- a. % among girls  $6 \div 10 \times 100 = 60 \%$
- b. % among boys  $8 \div 12 \times 100 = 67 \%$
- c. % among total children  $14 \div 22 \times 100 = 64 \%$



**Information Collection**

**(from children’s experience and parents / local farmers)**

- Explain to the children that they are going to make a Rice Farming Calendar to find out about cultivation related activities throughout a whole year. Ask children what kind of work they help according the season.
- After the children make the ‘draft’ calendar, they are encouraged to check it with their parents / local people who are involved in rice farming. Missing information and other new information should be added to finalize the calendar.
- Additionally the children are asked to find out how much farm land, if at all, their families own? Through this the children can learn later about units of measuring land area. (Same way yield measuring units also can be investigated)





## Summarizing the Information

### Seasonal Calendar

Discuss with children about the calendar design to present the necessary information effectively. List up information needed to be put on the "Seasonal calendar of Rice Farming" in your area.

Several category of information might come up like the following example;

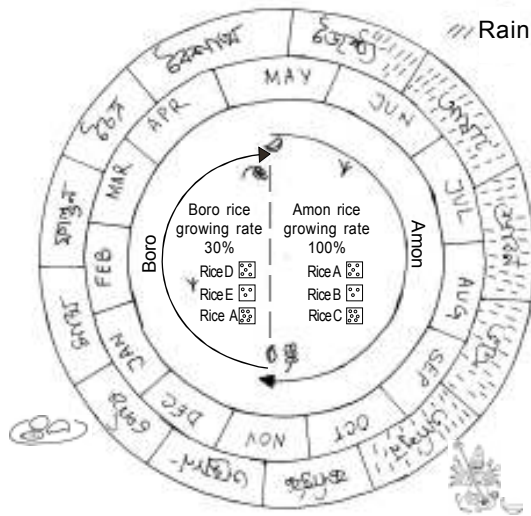
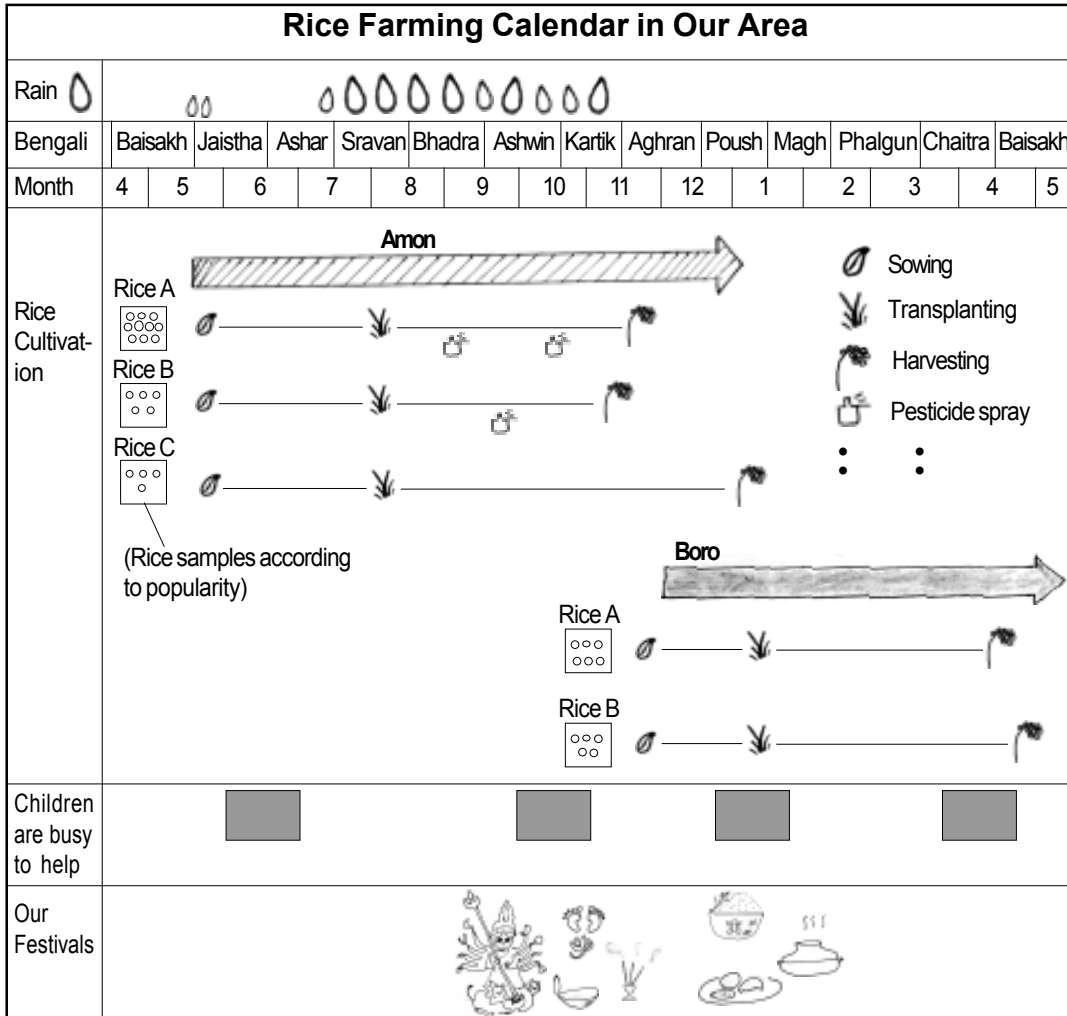
- Time Line: Season base (Summer, Autumn, Winter, Spring)  
Climate base (Rainy, Dry, Semi-dry)  
Month (Bengali month, English month)
- Rice Variety:
  - according to planting & harvest season  
Aaus (sowing in May-June, harvested in September)  
Aman (sowing in rainy season and harvested in December)  
Boro (sowing in winter and harvested in May/June)
  - according to duration of crop  
Longer growing period type  
Shorter growing period type
  - according to types of rice variety  
Traditional variety (Folk rice, Local variety)  
High Yielding Variety (HYV) - usually short height  
F<sub>1</sub> hybrid variety.
- Irrigated field or not (rain fed rice field) and source of irrigation water (surface water or ground water)
- Rice plant observation & work involved:  
preparing seedling bed, sowing seeds, preparing seedlings, transplanting, weeding, applying fertilizer(organic/chemical), spraying pesticides(if information available), flowering, maturing of grains, harvesting, threshing, processing into parboiled rice, storing, milling etc
- Who are involved in what: men, women, children, grandparents, bullocks, buffaloes, etc.
- Cultural events related with Rice farming & rice

### Measuring Unit

- Investigate with children about units of measuring land area and how rice yield is measured (by weight or volume), summarize the results.  
(see Step 2 –Review & Make sure, page. 38)

**Step 1 – Activity (A)**

[Example of Seasonal Calendar of Rice Farming]



[See expert's view point page 87 for more 'Rice & Festivals']



## Initial conclusion and Further Question

Look at the seasonal rice growing calendar that children have prepared. What do they understand from it ?

- Have a discussion with the children to find out the following points ;
- Do many farmers apply pesticides for rice cultivation ?
- How many kind of rice are cultivated in your area?
- Is their any relation between our festival and rice cultivation ? (Diwali, 'Pithe' making, Holi, etc.)
- List up all "further questions" which children want to know more about. Some questions can be solved through checking the books/ internet, and some questions can be chosen as the points which children can investigate in next step activity.

### Teacher's Note

#### Rice and Rice Cultivation Calendar

Though there were three cultivation seasons up to twenty years ago in West Bengal; there are at present two main rice cultivation seasons - Aman (rainy season's rice) and Boro (dry season's rice).

Usually in 'Aman' rice are sown in middle of May – June after a few drops of rain, sign of beginning of rainy season, and harvested around middle of Sep to early November. This cultivation depends on rainwater, therefore this is one of ways of traditional practice in rice growing. On the other hand 'Boro' cultivation needs irrigation facilities starting from middle of November for preparing seedlings and transplanting around January, followed by harvesting around April May.

Though the sowing time is same, harvesting time differs widely because each rice variety has different 'growth duration' lasting between 3-6 months (period from germination to plant maturity).

Short duration rice: 95-115 days

Middle duration rice: 120-130 days

Long duration rice: 150 -180 days.

There is Golden rule for getting better yield. That is said rice seedling duration should be 'More A Month More A Week'. This means if farmers grow 4 months duration rice, then 4 weeks seedlings should not be more than 4 weeks old. If 5 months duration rice, then 5 weeks old seedlings should be planted. But according to agricultural researchers, many farmers do not follow this rule. Usually seedling period becomes longer than required, sometimes seedlings become unnecessary tall for transplanting. This results in poor yields. It might be interesting to check the actual duration of raising seedlings and transplanting based on Calendar prepared by children.

Nowadays almost 90 % of rice varieties growing in 'Boro' are High Yielding Variety (HYV) which requires irrigation water, chemical fertilizer, and pesticides. Even in 'Aman' rice, 66 % - 70 % are HYV and the rest are traditional varieties. Generally HYVs have shorter growing period and higher grain yield than traditional varieties. It is said that this



is why farmers prefer HYVs than traditional varieties. You can sometime recognise the difference between HYV and Traditional variety through their names.

**Common varieties of rice cultivated in West Bengal**

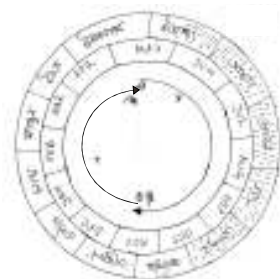
Traditional	HYV
Dudhesal	Ratna
Kaminisal	Minikit (IET 1444, IET 1036)
Roghusal	IR 30
Khejurchori , etc.	Pusa 33-30 , etc.

At present around 22-25 variety of rice are commonly cultivated in West Bengal. How many name of rice came out from children's initial survey in your area? Apart from each different rice names, more important thing is that children realize there are traditional variety of rice and HYV rice through making the rice-growing calendar in own locality. When children investigate 'Rice' and 'Rice field ecosystem' in later activity, children can realize Rice field ecosystem include other living things also. We would like to ask teachers to encourage children think about real value of traditional variety of rice, which do not disturb other food sources (like fish, shell, aquatic plants etc.) in rice field, since they do not require chemical fertilizer and pesticide unlike HYVs. Also children must know there are some farmers do grow HYVs rice organically. Identifying such organic farmers in your area is also important work which you can do with children.



## Feedback

### Step 1 – Activity (A)



Making a seasonal calendar described in this activity is useful approach for children to learn about how rice culture is going on in their own locality.

The calendar prepared by children will be basic data for proceeding to further activities.

Through this activity children are also expected to realize there are various important aspects to be investigated regarding Rice and Rice culture.

### Feedback Summary

ENRE Partner organization (District)	Swanirvar (North 24 Parganas)	Swanirvar	Swanirvar	Swanirvar	Kajla Janakalyan Samity (EastMidnapur)	Kajla	Vikramshila (Bardhaman)
<b>Village</b>	Chandalatty	Beliakhali	Bajitpur	Kalsur	Hinchi	Parulia	
<b>School/ Group</b>	Pally Unnayan Kendra	Suprobhat shangho	Kachari group & Majher group	G.D.S	Hinchi Vidyasagar KKB	Parulia Mother Teresa KKB	Lotus, Anirban, Shatadal group
<b>Students</b>	26 children (1 boy, 25 girls)	22 children (13 boys, 9 girls)	14 children (4 boys, 10 girls) 17 children (12 boys, 5 girls)	25 children (13 boys, 12 girls)	5 children (4 boys, 1 girl)	15 children (10 boys, 5 girls)	Each 15
<b>Class</b>	Class 5-9	Class 4-9	Class 5-10	Class 5-8	Class 7-8	Class 7-8	
<b>Teacher's name</b>	Fazlur Rahaman	Abul Karam	Sudip Kr. Mandal & Kankar Kr. Gain	Subhankar Bhabuk	Jabak Ali		
<b>Activity duration (Class periods)</b>	3 Jun- 15 Aug, 2002	Same	(5 class periods)	21 Apr - 3rd Sep, 2001 (8 periods)	1-13 Apr, 2002 (10 periods)	Apr-Jun, 2003 (7 periods)	Apr, 2003 & Jun, 2003

**Results** [Photos put by ENRE]

**Children and Rice Farming**

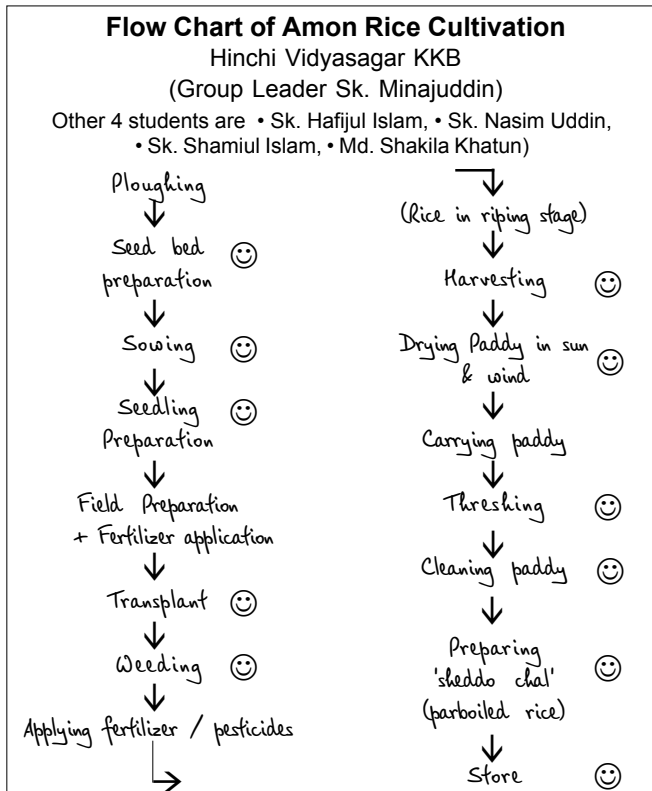
- What kind of work do children help in rice cultivation (Kolsur village, Hinchu village)
  1. Preparation of field before sowing paddy / Preparing bunds of each field
  2. Seed bed preparation & raising seedlings
  3. Sowing seeds (by broadcasting)
  4. Watering after sowing seeds
  5. Transplanting
  6. Weeding
  7. Rice harvest
  8. Carrying the harvested paddy and drying it
  9. Threshing & cleaning paddy
  10. Binding the straw for long term storage
  11. Help for processing Par boiled rice (by putting fire wood, stirring boiling paddy etc.)
  12. Help in preparing place for paddy storage.
- 5 students (class 7-8) from the group of Hinchu Vidyasagar KKB prepared the flow chart of rice farming work. (According to their report ENRE put ☺ mark for the work in which children helped.)



Ploughing



Transplanting



Carrying harvest



Drying paddy

■ Percentage of children who help rice farming (Beliakhari village)

19 families out of 22 children households do rice farming (89%). All children help their parents in farming work. 3 families do not have land for rice farming. Their fathers work as farm labors. They often manage their family needs through fishing.

Therefore children from these three families know also fishing and are skilled in catching fish.

\* In our area the main source of livelihood is agriculture. Therefore almost all children help rice farming work and other cultivation work throughout all season whole year.

(Most of ENRE network groups belong to rural areas. According the teachers' reports about 80-86% children help almost all kind of rice farming work, except the work of ploughing by bullock and applying chemical fertilizer and pesticides. / ENRE)



*Threshing : Usually men work with stone and women use Pedal thresher, we saw young girls threshing rice using this machine.*

*(ENRE / Chandra village, Bankura)*

## Rice Cultivation & Growing Calendar

- In our area there are 3 seasons of rice cultivation (Beliakhali, Bajitpur village)
  - Aus (sown in pre-rainy season - often broadcasted)
  - Amon (sown in rainy season and harvest in December - Kamai, Aashpali, Lalkamini, Tilok kochuri, Sobita, Sharno, Bangladesh patnai etc)
  - Boro (sown in winter and harvest in May/June - Minikit, 1444, Ratna etc)

Students found out Aus is cultivated in very small areas. Main cultivation season is Amon and Boro.
- 15 students from Shatadal group in Bardhaman district collected information from their family members who involved in rice farming.

Cultivation	Amon	Aus	Boro
Season	Rainy season	Summer	Winter
Months	Ashar - Shrabon (Mid Jun - Mid Aug)	Boishakh - Jaishtha (Mid Apr - Mid Jun)	Poush - Magh (Mid Dec - Mid Feb)
Harvest		Shrabon - Bhadra (Mid Jul - Mid Sep.)	
Rice Variety	Lal Sharno, Pankeji, Jingshal	Parijata, Nayanmani	IR-64, IR-36
Yield/Bigka	15 Maund (=40 ser or 37 kg)	12 Maund	20 Maund
Labors	12-14 person	14-15 person	20-22 person
Income	Rs. 2600/-	Rs. 1700/-	Rs. 3360/-
Expenditure	Rs. 1400/-	Rs. 1300/-	Rs. 2200
Surplus	Rs. 1200/-	Rs. 400/-	Rs. 1160/-

- Rice growing calendar
  - two types of rice according to cultivation period,  
Longer growing period type & shorter growing period type
  - two types of rice variety  
Traditional variety & High Yielding variety [HYV]

Considering these points, children made rice cultivation calendar.

4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4
Amon / Aus Rice											
(Chinese)	SW	—TP	—	F&P	—	—	—	—	—	—	HV
(Rabi)	SW	—TP	—F	—	—	—	—	—	—	—	HV
(Masuri)	SW	TP	—	F&P	—	—	—	—	—	—	HV
(Medi)	SW	—TP	—F&P	—	—	—	—	—	—	—	HV
Boro Rice											
	(Minkit) SW	—TP	—	—	—	—	—	—	—	—	F&P*
*	—	—	—	—	—	—	—	—	—	—	HV
(SW - sowing, TP - Transplanting, F&P - Apply fertilizer & pesticides, HV - Harvest)											

(prepared by Abdul Mondol - class 7)



## Rice Variety Appeared in Surveys Done by Children

### Rice growing at present in our area

Chandal Atty	Beliakhali village	Bajitpur village
	<ol style="list-style-type: none"> <li>1. Basmati</li> <li>2. Chinese</li> <li>3. Jabra</li> <li>4. Khitish</li> <li>5. Lakshmi Dighal</li> <li>6. Masuri</li> <li>7. Pankaj</li> <li>8. Roshi</li> <li>9. Swarnamasuri</li> </ol>	<ol style="list-style-type: none"> <li>1. Assam Mota *</li> <li>2. Bangladesh patnai *</li> <li>3. BR11</li> <li>4. Gobindo bhog *</li> <li>5. Hamai</li> <li>6. Jagannath *</li> <li>7. Jolahori *</li> <li>8. Masuri *</li> <li>9. Nutan Dhan *</li> <li>10. Pankaj *</li> <li>11. Sarno</li> <li>12. Sabita *</li> <li>13. Suresh *</li> <li>14. Tilak kochuri</li> <li>15. 1000/10 *</li> </ol> <p>- * 11 new varieties introduced during last 10 years</p>

### Local varieties of rice (traditional / folk rice)

Chandal Atty village	Beliakhali village	Bajitpur village (Rice variety cultivated before 10 years, information collected from 15 farmers)
<ol style="list-style-type: none"> <li>1. Basmati #</li> <li>2. Beri</li> <li>3. Boye</li> <li>4. Gobindo #</li> <li>5. Jabra #</li> <li>6. Kata rangi</li> <li>7. Meghi</li> <li>8. Dhan shiri</li> <li>9. Patnai peshari</li> <li>10. Lakshmi dighal #</li> <li>11. Lathi saal</li> <li>12. Masuri #</li> <li>13. Natara peshari</li> <li>14. Nileymoti</li> <li>15. Noon surat</li> <li>16. Arjun saal</li> <li>17. Padma</li> <li>18. Pala jere</li> <li>19. Pipre kele</li> <li>20. Parangi</li> </ol>	<ol style="list-style-type: none"> <li>1. Arjun saal</li> <li>2. Basmati #</li> <li>3. Beri</li> <li>4. Boye</li> <li>5. Dhansiri</li> <li>6. Dighal #</li> <li>7. Gobindobhog #</li> <li>8. Kantarangi</li> <li>9. Lakhi</li> <li>10. Lalpatnai</li> <li>11. Lathisaal</li> <li>12. Masuri #</li> <li>13. Matchall</li> <li>14. Meghi #</li> <li>15. Nagra peshari</li> <li>16. Noonsurat</li> <li>17. Nileymoti</li> <li>18. Padma</li> <li>19. Palajore</li> <li>20. Paranghi</li> </ol>	<ol style="list-style-type: none"> <li>1. Akundi #</li> <li>2. Ashpali #</li> <li>3. Bota dhan #</li> <li>4. B.R. 11</li> <li>5. Dhulobichi #</li> <li>6. Hamai</li> <li>7. Hogla Vethe #</li> <li>8. Kalakochu #</li> <li>9. Kantarangi #</li> <li>10. Kejur chori #</li> <li>11. Keyrshali #</li> <li>12. Kumuro gor #</li> <li>13. Lal balam #</li> <li>14. Lal kamini #</li> <li>15. Lal patnai #</li> <li>16. Meghi #</li> <li>17. Morich saal #</li> <li>18. Mota dhan #</li> <li>19. Pipre kele #</li> <li>20. Sharna</li> </ol>

21. Uri  (# decreasing variety, others are already)	21. Patnai peshari 22. Piprekele 23. Purni 24. Radhuni pagla 25. Ratna # 26. Uri (# growing at present)	21. Shro patnai # 22. Tilak kochuri  (# decreasing variety compared before)
---	---	--

- Summary chart made by children. Information collected from their family members. (Kajla)

No.	Rice	Variety	Price	Colour	Cultivation time	Climate	Plant structure	Remarks
1.	Patni	Local	4/-	White	Rainy season	A lot of rain	Long	
2	Bhunri	Local	7/-	Grey		Medium rain	Short	
3	Minkit	Local	6/-	White		Medium rain	Medium	
4.	Rupa	Local	7/-			Medium rain	Short	
5.	Swarna-masuri	Local	6/-			Much rain	Long & thin	
6.	Pankaj	Local	5/-		Late summer to early rainy season	Medium	Medium	
7.	Balamsur	Local	7/-		Rainy season	Much	Medium	
8.	Sabita	Not local	6/-			Hot climate	Long	
9.	1000-9	Local	5/-			Medium rain	Medium	
10.	Gobindo-bhog	Local	6/-			Much	Long	
11.	Masuri	Local	7/-			Medium	Medium	
12.	Ira (possibly one of the IR varieties)	Not local	8/-		Summer & Winter	Hot climate	Short	

■ Rice Variety — present and past

Rice Variety at present (Anirban Group / Vikramshila - Bardhaman, April 2003)

Name of Rice	Cultivation Season	Growth Duration	Price / Sack (about 60 kg)	Yield (/ Bigha ?)
Lal Sharnol		90 days	Rs. 270/-	15 Maund
IR - 64	Rainy season	75 days	Rs. 300/-	20 Maund
IR - 36	Rainy season	75 days	Rs. 260/-	20 Maund
Lakshmi	Rainy season - summer	50 days	Rs. 260/-	12 Maund
-	Rainy season	90 days	Rs. 270/-	17 Maund
Sada Sharma	Rainy season - summer	100 days	Rs. 260/-	16 Maund

Rice Variety in Previous time (Lotus group / Vikramshila - Bardhaman, April 2003)

Name of Rice	Cultivation Season	Growth Duration	Price / Sack (about 60 kg)	Yield (/ Bigha ?)
Sua Kalma	Rainy season	150 days	Rs. 400/-	8-12 Maund
Gola Aman	Rainy season	150 days	Rs. 320/-	6-7 Maund
Meghi	Rainy season	170 days	Rs. 240/-	8-10 Maund
Chorui Murkhi	Rainy season	150 days	Rs. 600/-	4-6 Maund
Nera - Kero	Summer	90 days	Rs. 300/-	8-10 Maund

(though there is not mentioned, price & yield might be counted as paddy not rice / ENRE)

[Unit : 1 Bigha = 20 Katha = about 1/3 Acre, 1 Maund = 40 sers = 37 kg (approx)]

■ Summary Chart on Boro rice cultivation

(information collected from 12 farmers, Parulia village / Kajla)

No.	Name of Rice	Cultivation time	Hight of plant	Production/ Bigha	Price/ Maund	Straw bundle/Bigha
1.	Ananda (1)	4 months	3ft.	60 kg	Rs. 150/-	5,000
2	Lal shankar	4 months	3ft.	60 kg	Rs. 180/-	4,000
3	IR 36	4 months	3.5ft.	60 kg	Rs. 140/-	5,500
4.	Ananda (2)	5 months	3ft.	50 kg	Rs. 140/-	3,000
5.	Ganga Kaveri	4 months	2.5ft.	60 kg	Rs. 160/-	4,000
6.	75	4 months	2.5ft.	60 kg	Rs. 150/-	5,000
7.	Choto Shankar	4 months	3ft.	50 kg	Rs. 140/-	3,500
8.	Boro Shankar	4 months	3ft.	50 kg.	Rs. 140/-	4,000
9.	Pathar Kuchi	4.5 months	3ft.	40 kg	Rs. 140/-	5,000
10.	Ranjit	4 months	3.5ft.	40 kg	Rs. 150/-	3,500



## Sharing Ideas

We got a good amount of feedback on this activity since most of our network groups are located in famous rice cultivation areas of West Bengal. If we could get more information from dry land districts like Bankura, Birbhum, and Purulia district, it would be more interesting.

Each group listed 7-15 varieties of rice which are growing at present in their area, and 20-26 varieties as local variety including traditional varieties the cultivation of which have been discontinued or are reported to be decreasing rapidly.

You must be surprised to see so many names of rice varieties appearing in the feedbacks from children.

But it is interesting to find out that only very few rice varieties are common among three different districts. Those rice varieties are;

- between North 24 parganas district and East Midnapur district –  
**Masuri, Gobind bhog, Pankaj, Swarna masuri, and Sabita,**
- between East Midnapur district and Barddhaman district – **IR 36**
- between Barddhaman district and North 24 Parganases district –  
**Meghi, Pankaj, Minikit**

Even within the same district like North 24 Parganas, as you see, listed rice varieties in feedbacks are quite different according to respective villages. Rice names commonly listed up among three different villages (Chandal atty, Beliakhali, Bajitpur) are only four varieties of rice, Katarangi, Masuri, Meghi and Pipre kele among total 62 listed varieties by three groups.

(We listed up all names of rice that appeared in children's feedback on page 77.)

You must wonder how farmers can recognize such wide variety of rice. It must be interesting to enquire farmers with children regarding this. After children collected information and listed up rice variety in own locality, teachers can help children to categorize rice varieties according to growing season, type of variety (traditional or HYV) and plant character etc for further investigation. If you are a teacher in urban school, you can refer these feedback made by rural school children as an interesting teaching materials for urban school children to learn about diversity of rice varieties. (City children can also do survey of rice varieties available in market & Fair Price shops)

Other important thing is to find most of children help rice farming work in their house. Since wide portion of the work in rice cultivation is done by the human power in this country, children's contributions counts a lot. It must be interesting to collect information & photographs on other country's situation through books or internet. Discuss with that rice cultivation in developed countries are all done by machine..... is it really cost effective & environmental friendly to grow rice in all areas & seasons or not?



# Rice

## Step 1 — Preparatory Work — Activity (B)

### 'Cooked Rice, Puffed Rice, Flattened Rice ..... Investigating Various Types of Rice and Rice Based Products'

What kind of rice and rice-based products do children eat at home? Why so many varieties of rice and different prices? Are the all rice cooked in same way? Let's investigate our main food — Rice and its Products.

[ 🏠 both for rural & urban schools 🧑‍🎓 class 5 to 8 🧠 brain storming, listing, collecting information, comparing 📖 weight and volume (Math), nutrition value, cooking method (Health & Home Science) 🕒 2 - 3 periods (1½ hours per period)]



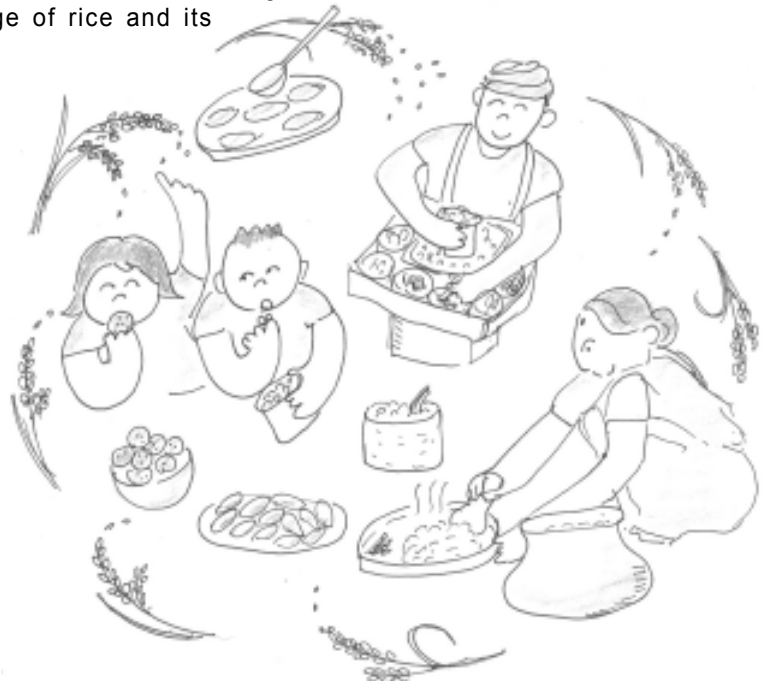
### Objectives

- To create interest for learning about 'Rice' as food and how it processed in different ways
- To know about what kind of rice & rice-based products are available in local market



### Success Indicators

- ➔ Children become interested to know more about the actual process of producing different rice-based products.
- ➔ Children realize that there are some relations between Rice harvest and festivals.
- ➔ Children want to know that besides eating, what are the usage of rice and its by-products.

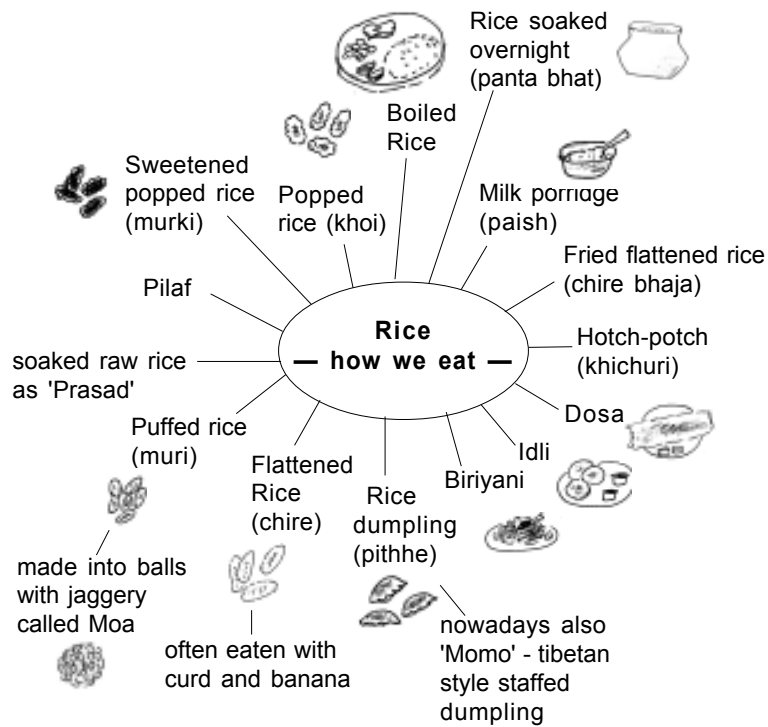


**Activity**



**Creating Interest & Motivation**

- Ask children how they eat Rice and rice-based products. Write down those items at random without giving any comment.

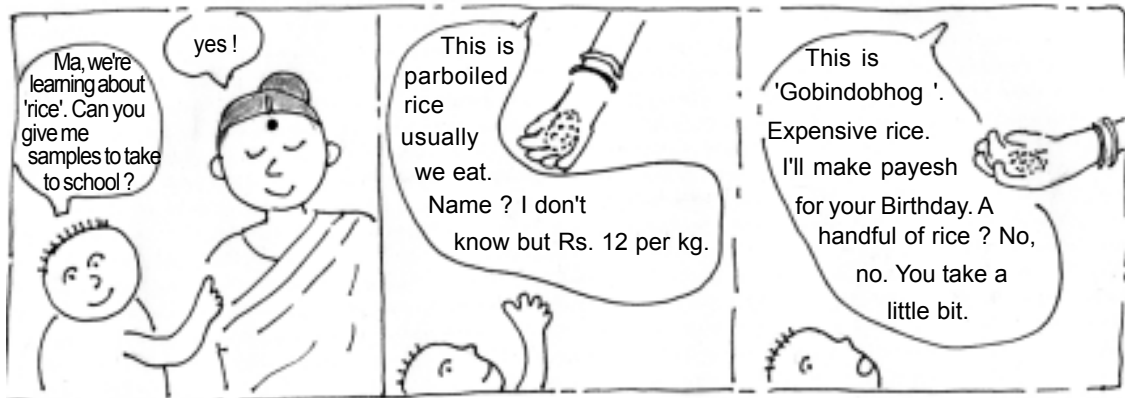


- Discuss with children whether these listed items are cooked (or processed) from same variety of rice.



## Collecting Information (through children's experience)

- Ask children to bring a handful of rice from their house along with information from their mothers and family members. (There might be 2-3 kinds of rice at home. All kind of rice should be brought as samples.)  
Attached information; Rice name, Type of rice (Parboiled rice or Raw rice), Price / Kg, From it is bought, Why we eat this rice (the reason for choice), How to cook
- Children are asked also to collect information from their family members about the process of making rice-based products (like popped rice, puffed rice, flattened rice etc). If available, information about any person or small factory that produces such products also needs to be collected.



## Summarizing the Information

- Divide the children into groups, and each group are asked to check all kinds of rice brought by group members. Compare the rice samples and categorize them according to grain size / shape, flavour, processing method etc.
- Each group are requested to make a summary chart on collected rice, along with the information of other rice products.
- Gather each group summary charts, and prepare a Class summary chart.

[Example of Summary Chart]

Name of Rice	Type	Price (per kg.)	Buying from	The reason for choice	How to cook	No. of samples brought
Ratna	Parboiled rice	8/-	Market	Cheap, tasty	Boiling rice	6
Minikit	Parboiled rice	17/-	Market	No flavour, small grains	Boiling rice	5
IR 8	Parboiled rice	10/-	Ration shop	.....	.....	4
Kamini	Raw rice	23/-	Grocery shop	Tasty, small grains	Boiling rice, Pilaf	4
Basmati	Raw rice	31/-	Grocery shop	Long slender grain, fluffy, aromatic	.....	3
.....						
.....						

(usually parboiled rice needs longer cooking period, especially if it is from local paddy variety, cooked rice can be kept longer too).



### Initial Conclusions and Further Questions

- Check with children how many handfuls of rice make 1 kg. and compare volume with other rice-based products of same weight. Discuss with children that key point of the processes making rice-based items is how much paddy/rice to be dried.
- Identify the most popular rice in households and the reason.
- Find out the difference between parboiled rice and raw rice, and the reason why parboiled rice is usually eaten in West Bengal.
- Did 'Hand pounded rice', 'Complete rice (Brown rice)', or 'Imported rice (Thai rice etc.)' appear in the summary chart made by children? It might be interesting for the children to learn Rice culture 'Past' & 'Present'.
- Discussion on the several ceremonies / festivals related with Rice. Children can write essay on it.
- List up what children want to further investigate based on this preparatory activity.

(Refer step 2 for more information on rice type & rice based processed food)




*We can see many kinds of rice in market... different size, shape, colour & price...*

## Feedback

### Step 1 – Activity (B)



 You can conduct this activity with both urban and rural children, since they investigate Rice and Rice-based products through their daily diet.

Children must find out rice are used in various ways in our food culture. Hope this activity becomes a good starting point for children to learn and investigate more about Rice.

## Feedback Summary

ENRE Partner Organisation (district)	Swanirvar (North 24 Parganas)	Swanirvar	Swanirvar
<b>Village</b>	Chandal atty	Beliakhali	Kalsur
<b>School / Group</b>	Pally Unnayan Kendra	Suprobhat Sangha	G.D.S
<b>Group</b>	26 children (1 boy, 25 girls)	22 children (13 boys, 9 girls)	25 children (13 boys, 12 girls)
<b>Children</b>	Class 5 - 9	Class 4 - 9	Class 5 - 8
<b>Teacher</b>	Fazlur Rahman	Abul Karam	Subhankar Bhabuk
<b>Activity duration</b>	3.06-15.08.02	Same	21.04.01 - 03.09.01 (5 periods)



## Results [Photos in this feedback are put by ENRE]

### Popular Variety of Rice

#### ■ Top 3 commonly eaten rice by children (Chandal atty village)

1. Minikit, 2. Masuri, 3. Chinese

#### ■ What rice we eat / the price of rice (Kolsur village)

Minikit      Ratna      Nayantara      Chinese      Roshi      Sharna masuri      Sharna      Jaga  
 Rs. 450-475      Rs. 370      -      Rs. 330      Rs. 330-340      -      -      -  
 The price of paddy (per one jute bag - usually 60kg)

#### ■ 26 students collected information regarding rice from their houses

(Chandal atty, Jul, 2002)

No.	Name of Rice	Type	Price/ kg	Available	Why they like	Preparation	Collected Sample
1.	Chinese	Par boiled rice	9/-	Market	No Swell	Cooked rice	22
2	Roshi	Par boiled rice	9/-		Cheap	Cooked rice	20
3	Masuri	Par boiled rice / atop rice	10/- 12/-		Small grain, no swell	Cooked rice / Polao	21
4.	Sharno masuri	Par boiled rice	10/-		No swell, tasty	Cooked rice	22
5.	Jabra	Par boiled rice	9/-		Tasty	Cooked rice	15
6.	Khitish	Par boiled rice	10/-		Tasty	Cooked rice/ Polao	12
7.	IR 8	Par boiled rice	10/-		No swell, tasty	Cooked rice	12
8.	Mill chaal (not a very particular variety)	Par boiled rice	6.30/-	Ration shop		Cooked rice/ Puffed rice	11

(In West Bengal Par boiled rice (Siddho or seddho chaal) are common and non processed rice (atop chaal) is eaten mainly on special occassions often used to cook soft rice for sick people & also used for making pilaf, biriyani, milk porridge etc / ENRE)



## Usage of Rice

The following are compiled from each feedback from three groups, Swanirvar.

### ■ Rice – based products (food)

From Paddy : Rice, Popped rice, Sweetened popped rice, flattened rice

From Rice : Cooked rice, Puffed rice, Rice flour

From Rice flour : Rice dumpling (pithe), (Use for drawing Alpona in festival)

From Rice Bran : Edible oil

### ■ Different preparation from different variety of rice

Listed preparation are made from different rice variety. Students surveyed with local people (40 families) –30 housewives, 5 farmers, 2 female cooks, and 3 bakeries.

(Chandal atty village/ Swanirvar)

Preparation	Rice Variety	Number Suggested
Special preparation		
Pilaf / Biriyani	Miniket	35
(Milk porridge)	Basmati (raw rice)	40
Khichuri (Hotch Potch)	All kind of rice	38
Muri (Puffed rice)	Mill chaal	
Chire (flattened rice)	not a particular variety	40
Khoi (popped rice)		
Various kind of pithe	Powder of all kind of raw rice	40



(Jan 2001, Birbhum)

### 'Muri (Puffed Rice) Making'

Parboiled rice paddy — soak paddy in water with salt — dry in sunlight — put paddy in big earthen pot and heat dry while stirring (2 hrs.) — make it puff in hot sand — clean with sieve. From 1 kg paddy 2 tins (5 kg oil tin size) muri can be produced. Suitable rice varieties for making muri are Kobiraj saal, Chapa saal, Bura karankar etc. (SAN project / DRCSC)



■ Other use of rice, apart from food (Chandal atty village)

Using Rice husk : Fuel, Making cow dung cake(as fuel),Spreading the floor of poultry cages

- Using Rice Bran : food for animal, duck & hen
- Using Straw : main food for cow, roof for house, fuel, making idle of god, making scarecrow, making compost, using as a bed, mushroom cultivation, covering dead body(Muslim), use for packing materials.
- Using ear heads of rice plant : making some kind of decoration as symbol of hope in Festival.



Cow dung cake as fuel



Straw is main food for cow as well as cosy bed



Straw as roof material



Bird scare made by straw and earthen pot (Birbhum)



Straw for mushroom cultivation



Straw for making compost



Straw for packaging material (to avoid breaking earthen pots)



(Paddy straw hanging) 'Dhan Charas' by Santal



Core of idle is made by straw

## Information on Hand-pounded rice (Brown rice)

Information from the group of Chandal atty village, Swanirvar.

- Out of surveyed 40 families, 32 families buy rice from market, 8 families grow own rice. There is no Hand pounded brown rice (Dheki chhata chaal). But 12 families know about Hand pounded rice. Children asked why now this kind of rice is not commonly available. The reasons collected by children were;
  1. It takes too much time to pound (remove the husk)
  2. Machine milled rice looks pretty (white)
  3. Machine can mill a large quantity of rice at once
  4. It is very hard work to thresh and prepare Hand pounded rice



'Dheki'

## Rice and Celebration

Information from the group of Chandal atty village, Swanirvar.

- Marriage ceremony
  - Paint and make design of Alpona by using rice powder,
  - Welcome to new bride in husband's house - wishing her with paddy seeds and Durba grass (Bermuda grass) on her head, when the couple enters the room, husband spreads paddy on the floor. Paddy is kept in Khuci (a kind of special bowl) on his hand.
- Poush Parbon (harvest & winter celebration)  
Farmers celebrate new rice harvest. People prepare Payesh (sweeten milk porridge) and several kind of Pithe (sweetened rice dumplings) with New rice. People celebrate all together and have fun.
- Shabe barat (Musulim ceremony)  
Prepare Payesh & Pithe ,
- Firni  
Making firni (or payesh) from raw rice and serve it to poor people



Several rice offered in marriage ceremony

**Lakshmi Puja**

Lakshmi is very important goddess. She brings prosperity and wealth. Worship her with golden rice (ear heads of rice). Because our main food is coming from Paddy, we respect paddy as same as goddess of Lakshmi.

Besides these, Paddy is used in several festivals like Durga Puja (Hindu - in Autumn Oct-Nov) & Charak Puja (end of month of Choitra, middle of April)

(In our area most of the people belong the caste of Parui and Nomoshudhro.

Students asked the reason why paddy/rice are used in several festival, but they could not get clear answers. Our students want to know why we give so much importance to rice in puja/festival. / Comment from the teacher)

(see more information page 87)



'Kartik' festival (making small rice field in front of god idle)

**Sharing Ideas**

Information collected by children shows us how we, in West Bengal, have rich diversity of rice & rice-based food. It might be interesting to compare the results between from rural and urban area, if we could get feedback from urban school groups.

Some expert suggests that the quality of straw from rice plant of traditional variety and High Yielding Variety (HYV) is different. Straw is important material for making roof in rural area and also main food for cows and goat, as children's result shows. People says the roof made by traditional rice's straw last longer than HYV's one. Which straw do cow and goat prefer more? Teacher can encourage children to collect these kind of information from local people, too. This can be a good learning on rice as local natural resources.

When children prepare 'Rice plant usage chart', it is recommendable to put some illustrations also. (refer Step 2-Review and Make sure)



Straw of traditional variety is much longer than HYV's one

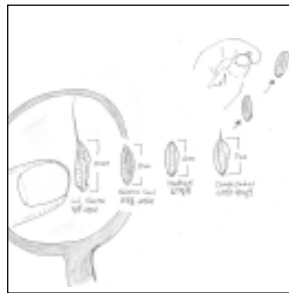


Brooms made by straw



# MEMO PAGE

Step - 2  
Review & Make Sure



for platform towards the next step




## Review & Make Sure


### Make Sure

#### Measuring Unit

When children collect information from family members and local farmers, they will realize people use traditional unit for measuring land size and rice yield. Usually, in West Bengal, 'Katha' & 'Bigha' are used for land area and 'Maund' & 'Bosta (sack)' are used for yield / weight of rice / paddy. Let the children compare these traditional units with the present measuring unit. Later, let make children estimate the size of classroom (or school garden etc) and then let them to measure it actually.

Traditional system	Old system	Metric system
<b>LENGTH</b>		
 <b>haat (hand)</b> 1 haat = 1.5 ft (=) 12 inch (=) 45 cm	<b>inch, feet, yard, mile</b> 1 inch (=) 2.5cm or 25mm 1ft (=) 30 cm 1yd (=) 0.9m 1 mile (=) 1.61 km (1609.34m) [12 inch = 1ft, 3ft = 1yd, 1760yd = 1 mile]	<b>mm, cm, m, km</b> 1cm (=) 0.4 inch (0.3937) 1m (=) 3.3ft (39.3701 inch) 1km (=) 0.6 mile (0.62137 miles)

#### AREA OF LAND

Traditional system	Old system	Metric system
 <b>Chhatak, Katha, Bigha, Shatak</b> 1 chhatak = 1haat x 1haat 1 katha = 16 chhatak (4chotak x 4 chhatak)	<b>inch, sq ft, sq yd, acre</b> 1 sq.ft (=) 0.09m <sup>2</sup> 1sq.yd (=) 0.8m <sup>2</sup> 1 acre (=) 4047m <sup>2</sup>	<b>mm<sup>2</sup>, cm<sup>2</sup>, m<sup>2</sup>, are, ha (hectare)</b> 1m <sup>2</sup> = 1m x 1m 1 are = 10m x 10m 1ha = 100 are = 100m x 100m

[1 acre = 100 decimal, 1 decimal = 48.4yd<sup>2</sup> or 40m<sup>2</sup> ]

1 Bigha = 20 Katha; 1 acre = 3 Bigha

Usually 1 acre = 3 Bigha or 4840 sq. yd

Then how many m<sup>2</sup> in 1 Katha ? 1 Katha =

1 Bigha =

m x m  
m x m

(please refer Teacher's note)

#### WEIGHT



**16 Chhatak = 1 Ser = 4 Poa (=) 1 kg.**

**40 Sers = 1 Maund (=) 37kg.**

- Usually 1 Jute sack called 1 Bosta (=) 60kg. Paddy (unhusked)  
(=) 80kg. Rice (milled) -> this is called '2 Mon Rice'
- Usually so called 'Sugar's Sack' / 'Fertilizer's Sack' is about 50kg, slightly smaller than 'Rice Sack'.
- Traditional measurement units are sometimes different scale/measurement in different districts within even same West Bengal eg. 1 bigha is 33 cents in some districts & 40 cents in others.
- In the old days paddy was never weighed but purchased and sold by volume.



'PAI'  
(Traditional measuring bowl)



Basket

### Teacher's Note

#### Calculation treating 4 and 16 as bases

In the modern (Metric) system everything increases or decreases by ten or its multiple. This makes multiplication, division easier and it is possible to do large calculations mentally (1 kilometer = 1000 meter = 100,000 centimeters)

Earlier system was mainly based on four and its multiples like 8,12,16,20,40 etc. but in that case quite a few rules had to be memorized, like Kadakia, Gandakia etc.

Even today in rural areas people use Ganda (4), Pan (20 Gandas or 80), Kahon (16 Pans or 1280) to count bundles of straw or jute. Another method of counting is – dozen (12) or gross (12 dozens or 144).

Old counting system

4 Kora = 1 Gonda; 5 Gonda = 1 Buri; 4 Buri = 1 Pon  
4 Pon = 1 Chouko; 4 Chouko = 1 Kahon

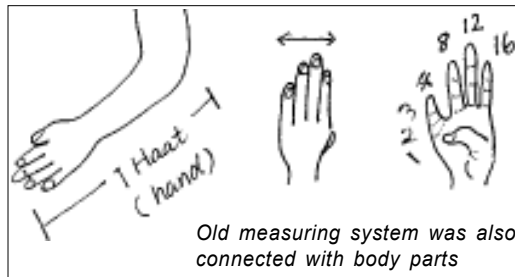
There used to be some methods to measure weights, like 4 Chhataks is equal to 1 Poa, 4 Poas or 16 Chhataks is equal to 1 Ser, 40 Sers is equal to 1 Mon or Maund etc.

Mile was a unit for measuring distance, which once again was a 4 multiple based system. One mile was equal to 8 furlongs or 1760 yards (440 x 4).

How about land size ..? In earlier ages 1 Bigha had a piece of 80 Haat x 80 Haat lands (Haat means Hand, 1 Haat = 1.5 ft), i.e. 120 ft x 120 ft. One twentieth of a Bigha is called a Katha, so 1 Katha is equal to 720 sqft.

Like these, the number '4' has a major role to play in earlier system of measurements. It might be interesting to think about with children why is it so. Also these old units are commonly used in daily phrase in Bengali.

For example, 'Sat Kahon' (in Bengali '7 Kahon' meaning somebody talks and behaves exaggeratedly manner) or 'Koray Gondhay' (meaning something exact amount to talk, expect, demand etc). It is also interesting for children to understand old measuring units contribute to make language rich.



Same with money counting. Up to the year of 1960, Ana was used as currency. That time 16 Ana used to make 1 Taka (at present Rupee). That is why even now 50 paise (1/2 of 1 Rupee) is called 'Aat Ana (8 Ana)' or 'adhuli' & 25 Paise is called 'Char Ana (4 Ana)' or 'siki'.

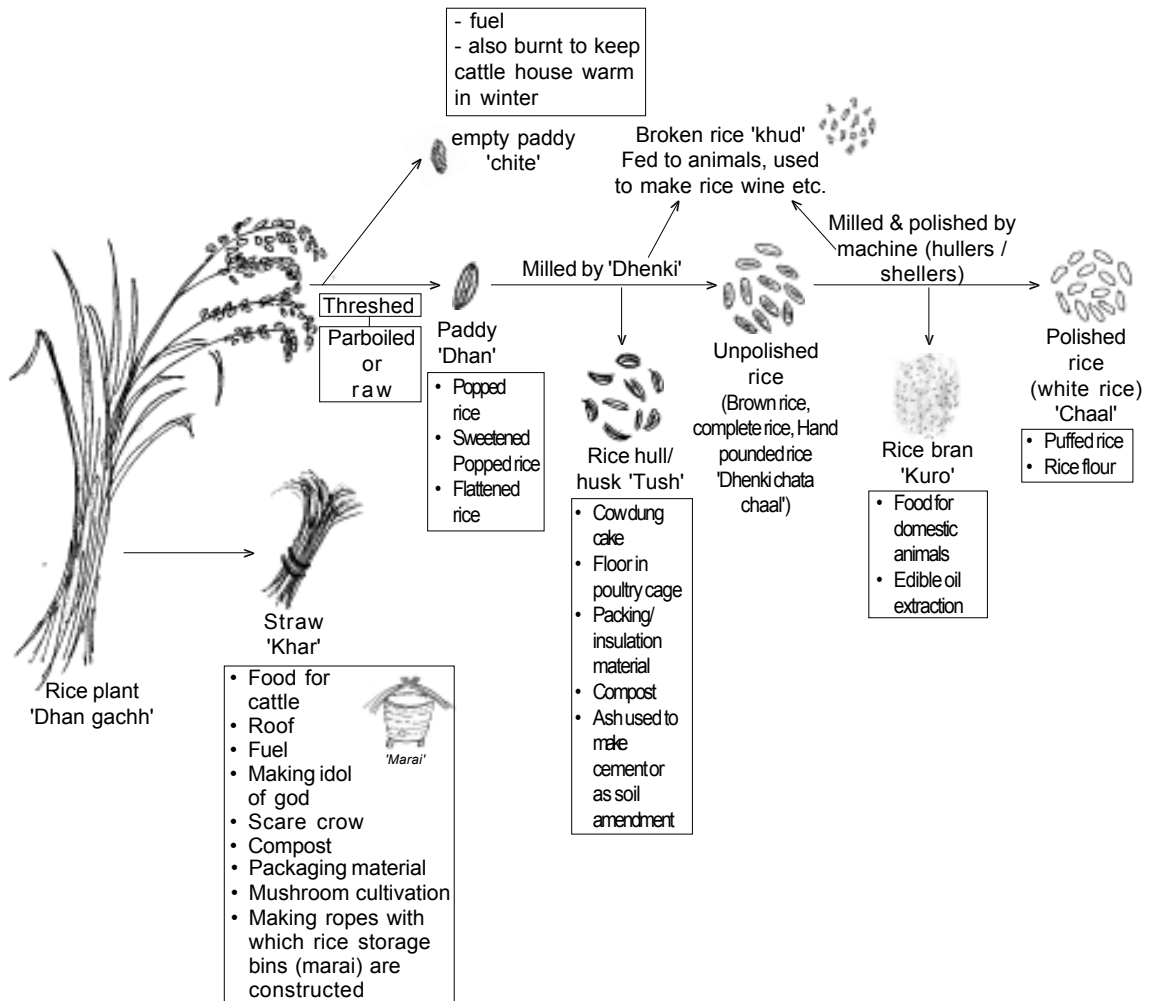
Whuum,  
that's why  
we say ....  
we use..





## Use of Rice and Rice Plant

In activity step 1 –(B), Children should realize that apart from food Rice plant is useful because, all parts of the plant are used in various ways. Can children, especially those who live in urban area, recognize what is rice husk and what is rice bran? As reviewing, let's make sure 'total' usage of Rice by making summary chart with drawings. The following is one of example.



## Rice in our language

Let's collect Rice related phrases, common sayings and proverbs. Try to know in what context those lines are used.

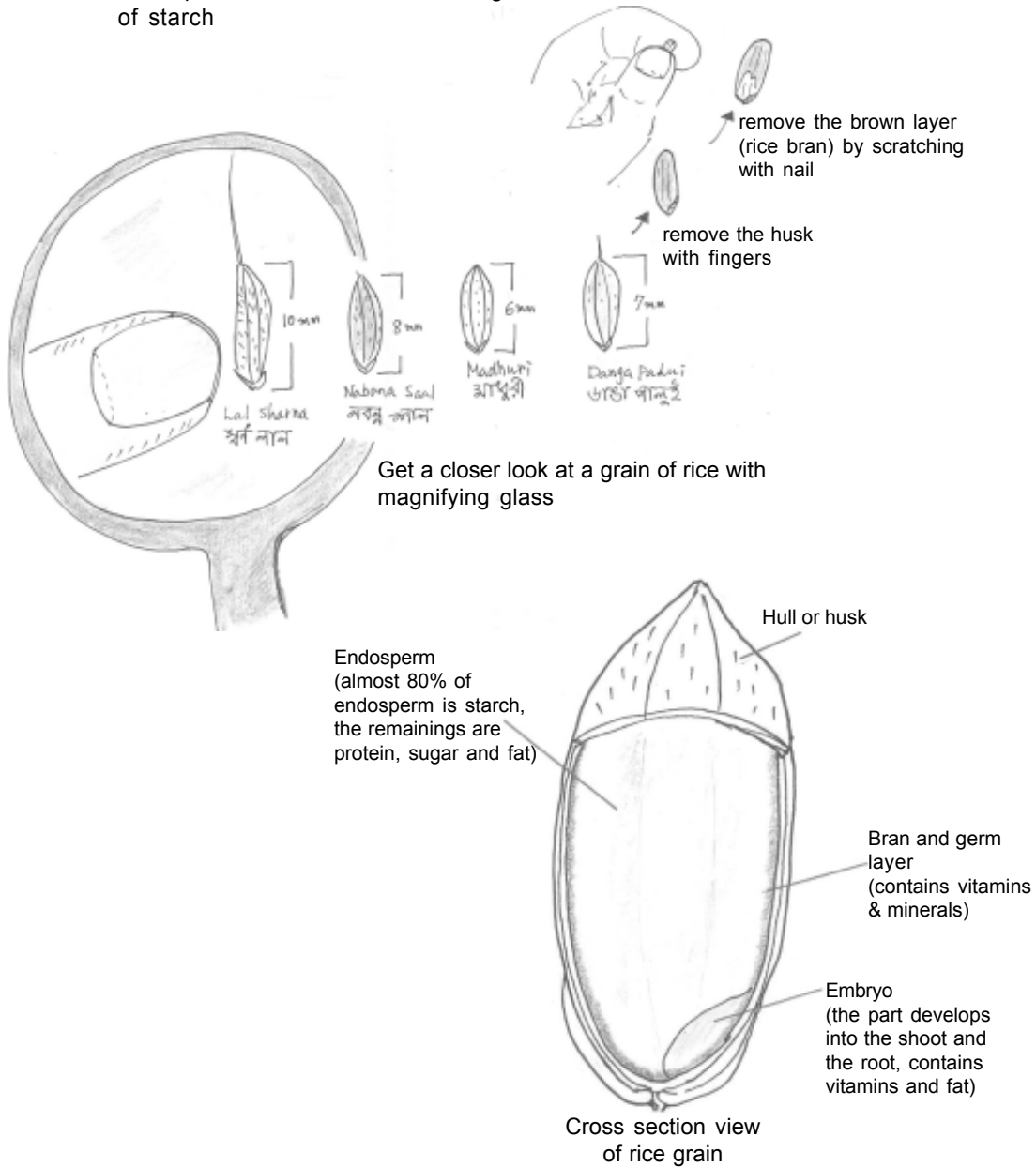
- 'Koto dhane koto chaal' : lit. how much paddy yield how much rice  
 'Purono chaal bhate bare' : lit. Old rice increases while cooking  
 'Dhan bhante shiber gajan' : lit. Singing of Shiva while threshing rice



### A Closer Look at a Grain of Rice

Using grain of rice/paddy that children brought as samples, let the children observe each grain closely with magnifying glass. Children will observe:

- Rice hull or husk, protective outer layer (any difference each rice variety ?)  
[Remove the husk by fingers, then underneath the hull/husk ..]
- Rice bran and germ layer, which is a thin layer of skin
- Embryo, from which the shoot and roots are developed  
[Scratch and remove the rice bran layer ..]
- Endosperm, the inside of the rice grain, which is hard and white and contains lots of starch





## Gap Filling Work

### Rice and Nutrition

#### 1) Parboiled rice and Raw Rice

Through the preparatory work, children will realize that Parboiled rice is commonly eaten in West Bengal rather than Raw rice. Why is it so? We could not get any further report regarding 'Parboiled rice'. Let us work with children to know more about 'Parboiled Rice'.

- Check book & Internet to find out whether Parboiled rice is common in other part of India / World? Is there any common factor, where Parboiled rice is common? (Geographical aspect)
- Investigate how to process Parboiled rice and record it. (for urban school children, it might be good idea to make field trip visiting some commercial unit where parboiled are processed in nearby district like in Bardhaman.
- Conduct experiment to see which stored rice grain is affected by insects, Parboiled rice or raw rice?
- Check books / Internet to find out nutritional value contained in parboiled rice and raw rice. Can children find any difference?

#### 2) Missing complete rice

As you see the feedback in Step 1- activity (B), nowadays 'Complete rice' is hardly available in market. Complete rice is unpolished rice, which rice bran covered rice kernels. Unlike Machine milled white rice, it called Brown rice or Hand pounded rice because it milled usually with '*Dhenki*' by pounding with manpower. Mechanise mills with Rubber hullers can actually make complete rice but they remove bran as much as possible and sell it to oil mill or as animal feed as they make more profit this way. But Complete rice has superior nutritional value than any other White rice. Let us make our own 'Complete rice' in classroom with children.

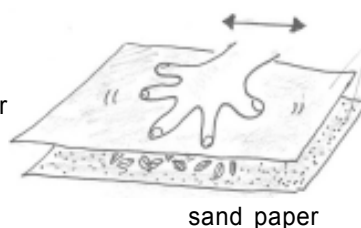
### The Rice Mill Activity

- Materials**
- Two mouse pads or flat rubber
  - Two sheets of sandpaper
  - One glass bottle (more than 1 litre) and one stick

**Procedure:**

- A. Turning paddy to brown rice;
1. Have the students place one mouse pad or piece of flat rubber on the desk.
  2. Place several pieces of paddy on one mouse pad or rubber piece and lay the second mouse pad or piece of rubber on top.
  3. Rub the two pieces back and forth until all of the hulls(husks) are removed from the rice kernels. Brown rice is prepared.
- B. Turning brown rice to milled white rice;
- Method (a):
1. Place one piece of sandpaper flat on the desk

- Place several kernels of brown rice on the sandpaper and lay the second piece of sandpaper on top.
- Rub two sheets of sandpaper together for 3-5 minutes. When finished, the students will be able to observe two distinct rice products: milled white rice, and rice bran.



Method (b):

- Put brown rice in the glass bottle till around 1/3 of portion.
- Pound it with the stick till rice bran removed slowly. The students can observe the rice gradually becoming white.

(lesson plan idea from Website 'California Rice Commission: Educators' & "Ine no Ehon" Nobunkyo, Japan )



## Teacher's Note

### — Parboiled rice , Indian's innovation —

Parboiled rice ('Seddho chaal' in Bengali), which is more nutritious than any other form of rice and retains a better shape after cooking, is India's gift to the world. The process of parboiling originated in India and widely practiced in this country since ancient times. It is estimated that more than half of India's rice crop is parboiled before hulling and, today, a fifth of the world's rice is parboiled.

#### How it's made

To make parboiled rice, rice (as paddy) is first soaked in water after which the excess water is drained off. It is then steamed once or twice, dried and pounded to remove the husk. Thanks to this, the outer layer turns hard and does not break during milling. Its appearance becomes yellowish and glossy. Parboiling is done both at the household level and on a commercial scale.

#### What it does

In technical terms, rough rice(paddy), becomes gelatinized by hydrothermal treatment, improving the cooking qualities and producing a shift of the vitamin's (especially vitamin B) and nutritive substances towards the inside, so that it retains a higher nutritional value.

#### Advantages

- Steaming splits the husk making its subsequent removal easier
- The grain is toughened resulting in reduced breakage during milling and polishing
- Milled parboiled rice has greater resistance to insects and fungus infection and better keeping qualities than raw rice.

- Parboiled rice retains more of the nutrients during milling, washing, and cooking.

(Despite its advantages, parboiled rice is not preferred in several areas due to its inferior colour and often unpleasant smell, which is mainly due to fermentation of paddy in the steeping tanks owing growth of bacteria and fungi.)

**And today :** By the effects of Globalization, the multinational company Nestle has tried to patent 'parboiled rice', once the World Trade Organization regulations becomes fully effective, indigenous parboiled rice could become a pirated product in export market, and one day in India too ! (see more in Expert' view point, page 84)



*Parboiled rice making by household level (Chandra, Bankura)*

#### Chemical Composition of Different Kinds of Rice

	Parboiled rice (Hand pounded)	Parboiled rice (Milled)	Raw rice (Hand pounded)	Raw rice (Milled)
Moisture %	12.6	13.3	9.6	9.7
Protein %	8.5	6.4	7.3	7.2
Fat %	0.6	0.4	1.2	0.54
Carbohydrates %	77.4	79.1	80.1	82.06
Crude fiber %	..	..	0.7	0.2
Mineral matter %	0.9	0.8	1.1	0.6
Calcium, mg./100g.	10	10	13	10
Phosphorus, mg./100g	280	150	182	87
Iron, mg./100g	2.8	2.5	2.8	2.2
Thiamine,pg./100g.	270	210	210	190
Nicotinic acid, mg./100g.	4.0	3.8	2.5	1.0
Carotene (as Vitamin A)	15 I.U./100g	-	-	-
Riboflavin	120pg./100g.	-	-	-

*(text adopted partly from 'Gobar Times, January 15, 2004' and information/data from "The Wealth of India, Raw materials Vol. VII, N-Pe"/Council of Scientific & Industrial Research)*

Step - 3

Investigation / Project Work



for creating child oriented activity



**Lesson Plans**



**Feedbacks**



## Rice

### Step 3 — Investigation / Project Work — Activity (A)

#### Let's Grow Rice Organically

Same as growing vegetables in home garden / school yard, you can grow own rice in your school garden. Let's try growing rice in a big tub or bucket without using chemical fertilizer & pesticides. Good care and good harvest.

[ 🏠 for urban schools (for rural schools it might be possible to conduct bigger scale with borrowed rice field from local farmers) 😊 class 6 to 8 📖 information collection, observation, gardening skill, record keeping, sketching, group work 📊 calculate harvest (Math), rice grow (Science) 🕒 class period required = 3-4 periods + regular caring, suitable season: May-Nov (for Amon rice), Nov-May (for Boro rice) 🌾 Traditional rice seeds are available from DRCSC The related activity: Booklet 2 - Insect - Step 3 - Activity (B)]



#### Objectives

- To understand the growth of rice and its growing condition
- To inculcate attitude of growing own food among children.
- To create awareness on organic rice farming



#### Expected Products / Achievements through this Activity

- Establish a 'School rice field' on a regular basis
- Children could cook and eat the rice grown by themselves
- Wall magazine made by children to share their survey result and experiment (for both preparatory and project work)



## Activity



### Review and Discussion

Teacher conducts shortly the review of the preparatory work. Through Activity 'Step 1 – (A)' children now know the seasonal calendar of rice and what kind of work are involved in it. If children have done Activity 'Step1-(B)', now they know they eat various kind of rice in various ways.

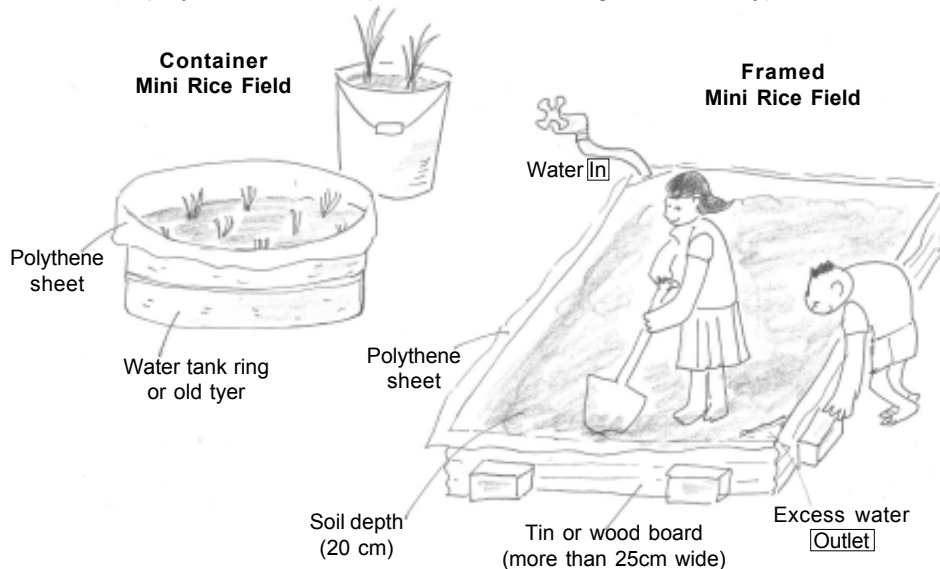
Teacher suggests the idea of growing rice by children themselves and has a discussion with them. Explain they can grow rice even in a bucket ! Make children understand they will grow rice organically.



### Planning & Preparation

Children are divided into groups. Each group is requested to list up what they need for growing rice.

- Growing place : There are several options;
  - a) small plot/part of rice field near the school (possible for rural schools)
  - b) 'container rice field' using a bucket, top, tin can, or a big plastic bottle/ container (possible for even as an individual experiment)
  - c) 'framed rice field' using frame materials (bricks, tin sheets etc.) and vinyl / polythene sheets (suitable for school garden activity)



- Soil
- Water (especially if 'framed rice field' is tried out, water facility should be nearby)
- Compost (possible to attach with activity 'Vermicompost making'/Creative Lesson Plan on Insects & Worms, p.p.61-62)
- Seeds (Aman or Boro? Traditional Variety or High Yield Variety? )
- Information (growing steps and calendar, children can collect information from local farmers, experts, books, or Web site etc. also refer Teacher's note p. 52) Record sheet (for keeping rice growth record regularly)

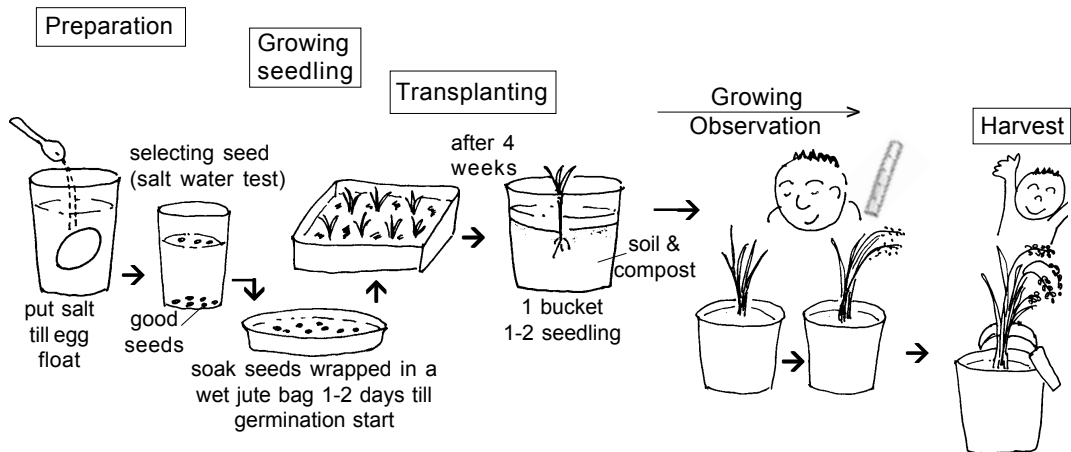


## Investigation Work (Rice growing project)

Even when children grow rice in a container, they need to follow the rice-growing calendar. Children can conduct this project work in either Aman rice season (starting middle of May and harvest around Dec.) or Boro rice season (starting middle of Nov. and harvest around May). They can try several variety of rice as group activity.

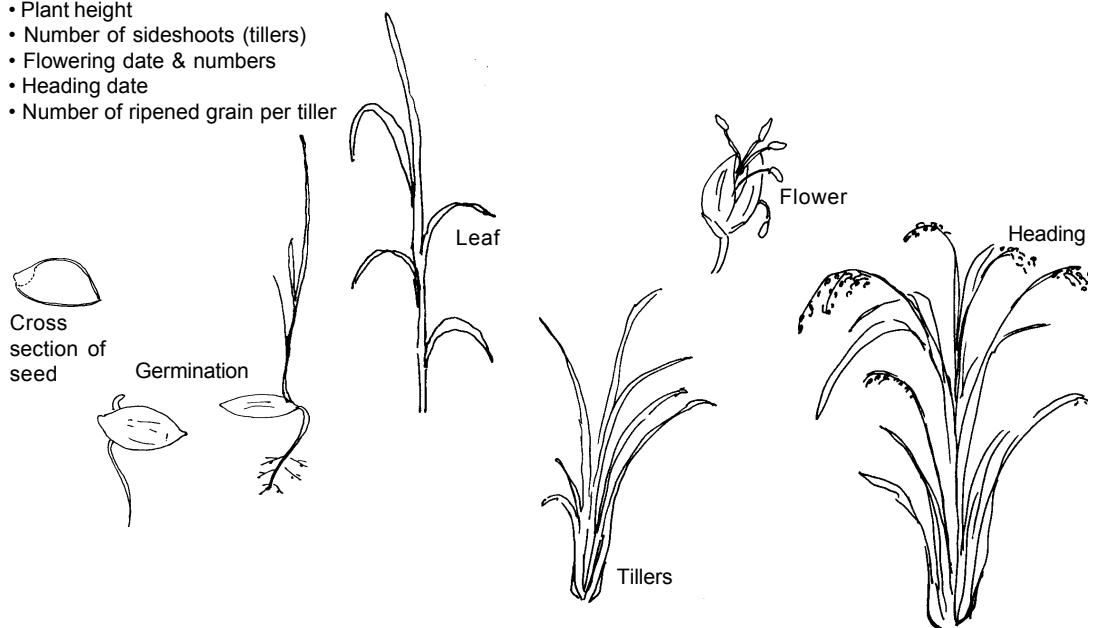
### [Example] — Boro Dhan

Beng. month	Aghran	Poush	Magh	Phalgun	Chaitra	Baisakh	
Month	11	12	1	2	3	4	5



### [Let's carefully observe]

- Keep record
- Plant height
- Number of sideshoots (tillers)
- Flowering date & numbers
- Heading date
- Number of ripened grain per tiller





### Step 3 – Activity (A)

On the process of rice growing, children might face some problems like insects attack or plant disease etc. Encourage children to control them organically. Ask local farmers who know traditional farming technique or contact ENRE. We can provide some information about natural way of controlling pest/ disease.

Some of important points to avoid pest problem are,

- Grow string seedlings
- Follow the proper rice growing season
- Transplant only 1-2 seedlings together at one position
- Keep proper distance (at least 25 cm x 25 cm) between clumps during transplanting.
- Do not apply too much compost or fertilizer to the plant



[Let's try and find out..]

#### Do Experiment !

Comparing Seedling Numbers



Transplant 1-2 together



Wide leaf, open tiller



Big head, good harvest



Transplant 8-10 together



Thin leaf, tight tiller



small head, poor harvest

Mean time children can investigate further enquiring points listed up by themselves in their preparatory work. It can be useful for children to collect information regarding;

- Rice farming area in India (geographical and climatical character of those area)
- Rice production for last 10 years in India and world
- The comparison between Modernized rice farming (which uses pesticides, herbicides, chemical fertilizer, machines) and Organic rice farming
- Interesting recipes of rice



**In India**



**In Japan**

*(Photo : Japanese Text Book class V, Social Study / Tokyo Shoseki)*



**In California, USA**

*(Photo : Website [www.askasia.org](http://www.askasia.org))*

### **Point to ponder**

The sizes of farm, cost of labour, costs of fuel etc result in widely different technology of planting rice. Rice yield per unit of land & labour is much higher in Japan and California but the overall energy efficiency (output vs input) is much lower compared to Asian small farms.



## Reporting & Summarizing

Each group is requested to make their presentation to report their project work. Have they got nice harvest of rice?

Ask children to calculate how many rice grain could be produced from one bucket/ framed rice field. Is the harvest from one bucket enough for one person's lunch? How many people can eat lunch from the rice harvested from their framed rice field/ experimental plot?

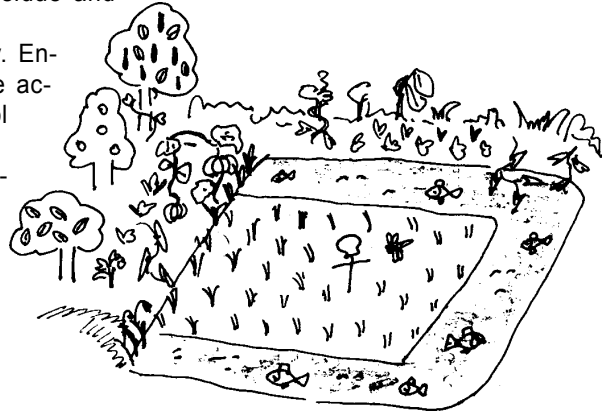
Gathering each groups report, children can make 'Wall magazine' about Rice & Rice farming. This is one of interesting way to share with other school children about what they have learnt.





## Toward Local Activity

- Study and survey about agricultural chemical used in other food production, along with news clippings. (Pesticide residue and our health etc.)
- Keeping 'School rice field' activity. Encourage children to keep continue activity of 'Food producing' in school garden
- Especially in rural area, try out interesting organic farming like Rice-Duck farming or integrated rice farming (rice-fish-vegetables-fruits trees).



### Teacher's Note

#### — Enjoyable Rice Farming —



There are several interesting practices in rice farming. 'Rice-Duck Farming' is one of such practice. This farming system is spread widely among organic rice growers in Japan, China, and Southeastern Asian countries. It is said this farming system has been practiced traditionally in those areas, but same like other traditional skills, it had almost disappeared along with agricultural modernization. But recently with the spread of organic farming movement, this practice is reviving again in those areas.

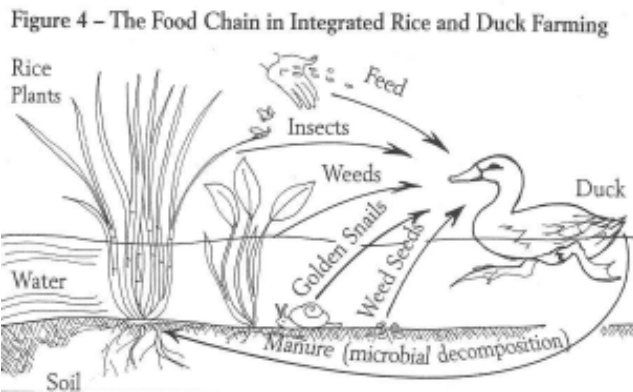
Basically this practice is releasing small ducklings at early stage in transplanted rice field and ducks can contribute weeding & pest control (by eating weeds and insects), giving oxygen (by paddling soil), and giving natural fertilizer by their manure. When the rice coming into ears, in that time, those ducks are removed from the rice field (otherwise, the ducks will eat up all rice grains!). The grown up ducks can also produce food (meat & eggs).

Of course there are certain techniques and small ducks need the protection, but most important points is 'Rice –Duck farming' is very enjoyable for farmers and even for children, too. Since it is one of most ecological way to grow rice, it is worth to introduce into School rice field activity. There are many case studies, which school children grow own rice through this method in Japan.

Ducks are very common in West Bengal also. Several farmers have started already own experiment of Rice-duck farming under guidance of DRCS. If you are interested in trying out this Rice-duck farming with your children, please contact ENRE. We can provide necessary information for you. Let's work out for new trial!



(SAN Project / DRCS Birbhum)



Source :  
 "The Power of Duck: Integrated rice and Duck Farming" Takao Furuno, Tagari, 2001.

## Feedback


### Step 3 – Activity (A)



'Growing rice' described in this activity can be conducted as a part of school garden activity or as a food producing project. Children are encouraged to keep their 'growing' work from sowing rice seed to harvest rice. Teachers are suggested to create 'group work attitude' among the children and utilize this activity as the opportunity, where children can learn more about 'Rice and Rice farming'. Also there is possibility to integrate several subject with this activity.

### Feedback Summary

<b>ENRE Partner Organisation (district)</b>	<b>Kajla Janakalyan Samity (East Midnapur)</b>
<b>Village</b>	Parulia
<b>School / Group</b>	Parulia Mother Teresa KKB
<b>Students</b>	15 children (10 boys, 5 girls)
<b>Class</b>	Class 7 - 8
<b>Teacher</b>	-
<b>Activity duration (Class periods)</b>	April - Jun 2003 (7 periods) followed by Step 1 - (A)



## Results

### ☺ Children's rice field affected by cyclone

After finishing the survey on growing rice variety in own village, 15 students (class 7-8) of Parulia village from Kajla group borrowed 4 katha rice field from a local farmers to conduct experiment, growing rice by themselves. They divided the field into two parts. One part for using compost, the other was for using chemical fertiliser. Total 5 Ser (about 5 kg.) seed paddy were sown.

But unfortunately their rice field was destroyed by the cyclone that hit their area in October in 2003. Cyclone problem is very common in this area.



## Sharing Ideas

Unfortunately we could not get enough feedback on this activity. Generally speaking, not only growing rice, but also other 'growing activity' like trees and medicinal plants are difficult activity to get the complete feedback from teachers & children. This is partly because this kind of activity takes more time and more commitment to complete a series of activity, and sometimes also natural causes such as cyclone and drought etc destroy their activity. (This gives us some idea though about how much risk the farmers have to take to supply food to us.)

Usually 'rice crop' appears in the school text books of social studies during class 5-7 standard, it is strongly recommended this kind of 'growing' activity should be attached with the class work, especially in urban area.

We want to share some of interesting examples from children's project in Japan.

The following case studies are extract from an Environmental Education Magazine "*Shokunou Kyoiku - No. 2, 1998, Nobunkyo, Japan.*



**[Case study – 1 : School Rice Field I'Shokunou kyoiku No. 2' pg 40-45.]**

The children of class 5 (Oobuke Primary School, Kubiki Village, Nigata) cultivated 5 are rice field through 'Rice-Duck Farming' , method. The children asked some cooperation and help from their grand parents who involved in rice farming, and shared their harvest with their community members. The children learnt also how to make traditional craft with rice straw. Their school rice field is cultivated every year by class 5 students.

**The Activity Flow:**

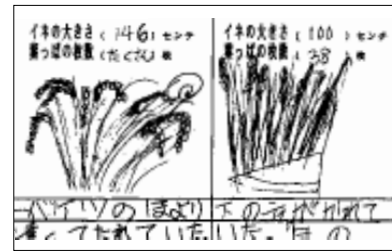
Prepare the rice field & seedling



Learn about 'Rice-Duck Farming' method  
Transplanting in May (in July, ducks were withdrawn from the rice field)



Keeping record  
(During their summer holiday in July-August, each group was requested in turn to visit and observe the rice field and to keep the record on the growth of rice plant and weather).



(From children's record. Observation record comparing between rice plant grown in bucket and rice field)



Learn the crafts using the straws



Harvesting rice by traditional way.



Process the paddy into polished rice



Cook and eat harvested rice



Sale rice in unique designed packet



(1 kg rice packet – 'Koshihikari' from school rice field by using no pesticides , rice duck farming from the natural growing way. Enjoy good taste!)



**[Case study – 2 : Growing traditional variety of rice/ 'Shokunou kyoiku No. 2' pg 60-67.]**

All students of Nakura Junior High School (Aichi, Japan) are involved in food producing activity. Nakura school is located in rural area and rather small scale school which has total 42 students from class 7 to 9. Every year, class 7 students cultivate Mushrooms, class 8 students try out fish farming and class 9 students grow tomatoes. Harvested products are consumed for their school lunch and also they sell surplus products to the community agriculture cooperative.

And all school students are involved in cultivating traditional rice (Red rice, one kind of sticky rice) in their 10 are school rice field every year for last 7 years. Around 124 kg. (2 rice sacks) of red rice is harvested from this field. Harvested rice is sold to community members and also cooked and served to children on special occasions like graduation ceremony and other festivals.

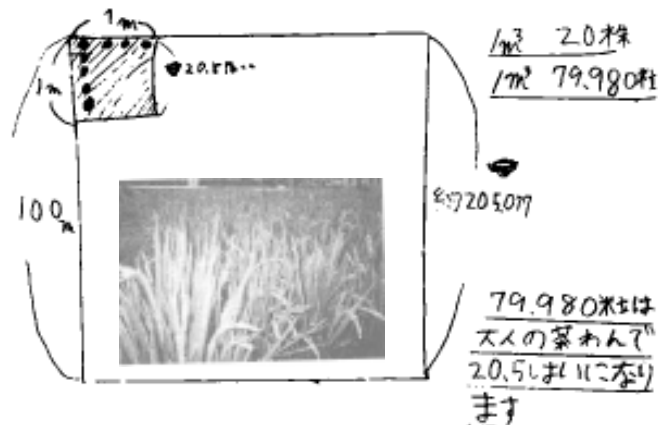


'Red rice'

**[Case study – 3 : Counting Rice Grain in one bowl / 'Shokunou kyoiku No. 2' pg 76-80.]**

Class 5 student (Kanagawa, Japan) tried to count the number of rice grains per a bowl which usually one adult eat in a meal. With the help from his family members, he found out about 3,900 rice grains in one bowl rice.

The he counted how many rice grains on tiller of rice plant had. He picked up one plant from nearby rice field and concluded 129 grains on one tiller. He observed about 31 tillers in one stump, therefore 3,999 rice grains in one stump. Surprisingly he found this number was very close to the number of rice grains in one bowl! Based on this counting, he calculated also total rice field area required to provide one meal to all citizens of his town.





# Rice

## Step 3 — Investigation / Project Work — Activity (B)

### 'Rice Farming in our Village'

Investigate further details of rice farming in your area. How many farmers are using pesticides and how many farmers are not? Let's have a close look at rice field. Can you recognise and difference between chemical used rice field and organic farming one?

[ 🏠 for rural schools 😊 class 7 to 9 📁 information collection, observation, interview, comparing factors, data processing (graph chart), sketching, group work 🧮 calculate harvest / balance income (Math), rice field ecosystem (Science) 🕒 class period = 3-4 periods + seasonal observation, 🌱 suitable season : May - November (for Amon rice), Nov - May(for boro rice) 📖 the related activity : Booklet 2-Insect step 3 activity B, Booklet 5-Birds-Step 3 activity A]



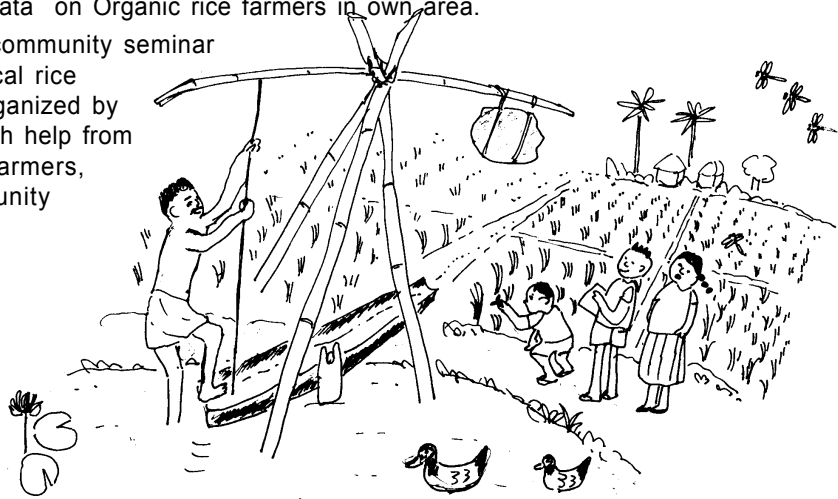
### Objectives

- To understand the real situation of rice farming in own area.
- To become aware about the impact of agricultural chemicals (pesticides/ herbicides, chemical fertilizer) on the environment and on our health.
- To become aware of the value of cultivating Traditional varieties of rice.
- To create awareness about Organic farming principles & methods.



### Expected Products / Achievements through this Activity

- The chart of 'Rice field ecosystem' made by children, showing the comparison between the field using agrochemicals and the other field without using such chemicals.
- Could children learn that the rice field should be treated not only for producing rice crop but also for other food like fish, crabs, and edible weeds etc.?
- Collected data on Organic rice farmers in own area.
- A kind of community seminar on ecological rice growing organized by children with help from teachers, farmers, and community members.



## Activity Process



### Review and Discussion

This activity is followed by the preparatory activity Step 1- (A) for rural school children. Have a look on the 'Rice farming calendar' again and related 'farming works' prepared by children. Have a short discussion with children what they have learnt in the preparatory work.

Focus on the farming work of applying several agro- chemicals like pesticides, herbicides, and chemical fertilizers etc. How much this kind of work appeared in children's preparatory work? Children have learnt also there are two types of rice, High Yielding Variety rice (HYV) and Traditional variety rice. Do farmers apply agro-chemicals same way to both types of rice?

Suggest children to conduct further investigative work to study whether there is any difference in these two types of rice field.



### Planning

Discuss with children the work procedure. The children should have the idea of total activity flow in their mind from the beginning.

- Preparation (make survey sheets)
- Conduct the survey among farmers
- Identify traditional rice farmers, Conventional rice farmers and organic / integrated rice farmers
- Field visit to three types of rice field (traditional farming, conventional farming & organic farming)
- Make report after summarizing the result
- Take action in community  
( → Conduct the sharing/ presentation activity among the community  
→ Start school organic rice field etc.)



**Traditional Farmers** don't use HYV seed & much fertiliser or pesticide and usually plough with bullocks;  
**Conventional farmers** are tilled with power tiller or tractor and use of lot of agrochemicals;  
**Organic farmers** do not use synthetic pesticides and fertilisers, but green manure, vermicompost, biofertilisers, azolla etc to improve soil fertility. They use either indigenous or HYV seeds.



## Preparation

Children are divided into groups and are requested to develop draft questionnaire for the farmers. Based on the draft ideas from each group, prepare the final survey sheet.

### [Example of the questionnaire]

Name of farmer \_\_\_\_\_

Age \_\_\_\_\_ Village \_\_\_\_\_

a) What kind of crop do you grow this season?

	Rice	Vegetables	Fruits	Others
Crop Name				
b)				
c)				
d)				
f)				

b) Please tell the name of rice variety you grew last year / 2 years ago.  
(Tell us the reason why you chose these rice variety)

c) From where do you get water for growing each crop?  
(How much water use for rice growing?)

d) Do you use Pesticides/ Herbicides/ Chemical fertilizer for growing each crop?  
(Please tell the each chemical's name for rice cultivation)

e) How long do you use these agro chemicals?  
(Did your father also use these kinds of agro chemicals?)

f) When do you apply these chemicals in rice farming?

g) Does your rice plant have pest attack/ disease problem?

h) Besides agro-chemicals, do you use any organic methods for growing rice?

i) What size is your rice field?

j) How much rice yield did you produce last year?  
Boro rice / Aman rice

k) The ratio of rice production for own consumption and Selling

l) Expenditure for growing rice last year.

m) What kind of other food stuff (fish, crabs, edible weeds, vegetables etc.) you get  
from your rice field? (at present / Previous time)

n) Other comment/opinion from the farmer

Survey Date / Time \_\_\_\_\_

Student Name (Group) \_\_\_\_\_

Survey sheet No. \_\_\_\_\_



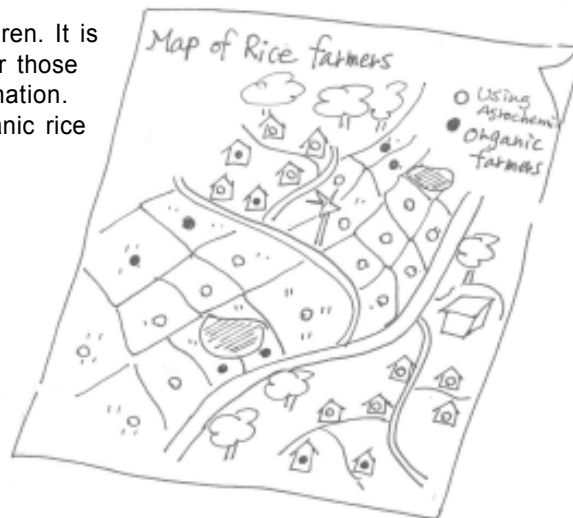
### Conduct the Survey among Farmers

Decide which group will survey which area. Each group takes 4-5 farmers' interview. Make sure that the children can explain farmers, from whom they get information, about the purpose of their survey clearly. The children should be able to explain also how the collected information will be treated and shared with farmers later.



### Identify Organic rice farmers and Conventional rice farmers

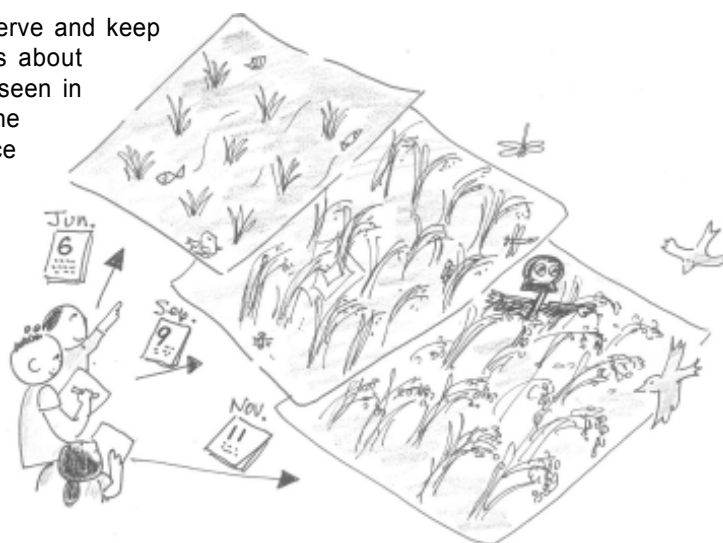
Prepare a simple village map with children. It is better to put some mark on the map for those farmers whom children collected information. Use different colored mark for the Organic rice growers.



### Field visit to two types of rice field (Organic farming & Conventional farming)

Each group visits two types of rice fields; one in which a farmer use agro chemicals (pesticides/ herbicides/ chemical fertilizer) and the other is organic rice field without using agro chemicals.

Children are asked to observe and keep record and make sketches about what creatures they have seen in each type of rice field. If the children can visit same rice fields in different seasons, their record will become very interesting and valuable to learning about Rice field ecosystem.





## Reporting and Summarizing

Each group is requested to summarize the survey result and tabulate them visually. Some examples are shown here.

### [Example-1: The tabulation on the result of rice variety]

**Aman Rice**

Survey date ....., Village .....  
Information collected from 50 farmers  
(Survey done by .....group)

	High Yielding Variety (HYV) rice		Traditional rice variety	
	50	25	25	50
Number of farmers	[Bar chart showing 50 for HYV and 25 for Traditional]			
Using Pesticides	[Bar chart showing 25 for HYV and 10 for Traditional]			
Using Herbicides	[Bar chart showing 30 for HYV and 15 for Traditional]			
Using Chemical Fertilizer	[Bar chart showing 35 for HYV and 15 for Traditional]			
Have irrigation facilities	[Bar chart showing 15 for HYV and 5 for Traditional]			
Using organic compost	[Bar chart showing 10 for HYV and 5 for Traditional]			
Using natural technique for pest/ disease control etc.	[Bar chart showing 15 for HYV and 10 for Traditional]			
.....				
Rice Variety (Number of cultivation farmers)	IET 1444 (.....) Ratna (.....) IR 30 (.....) ..... (.....)		Kamini shal (.....) Roghu shal (.....) ..... (.....)	

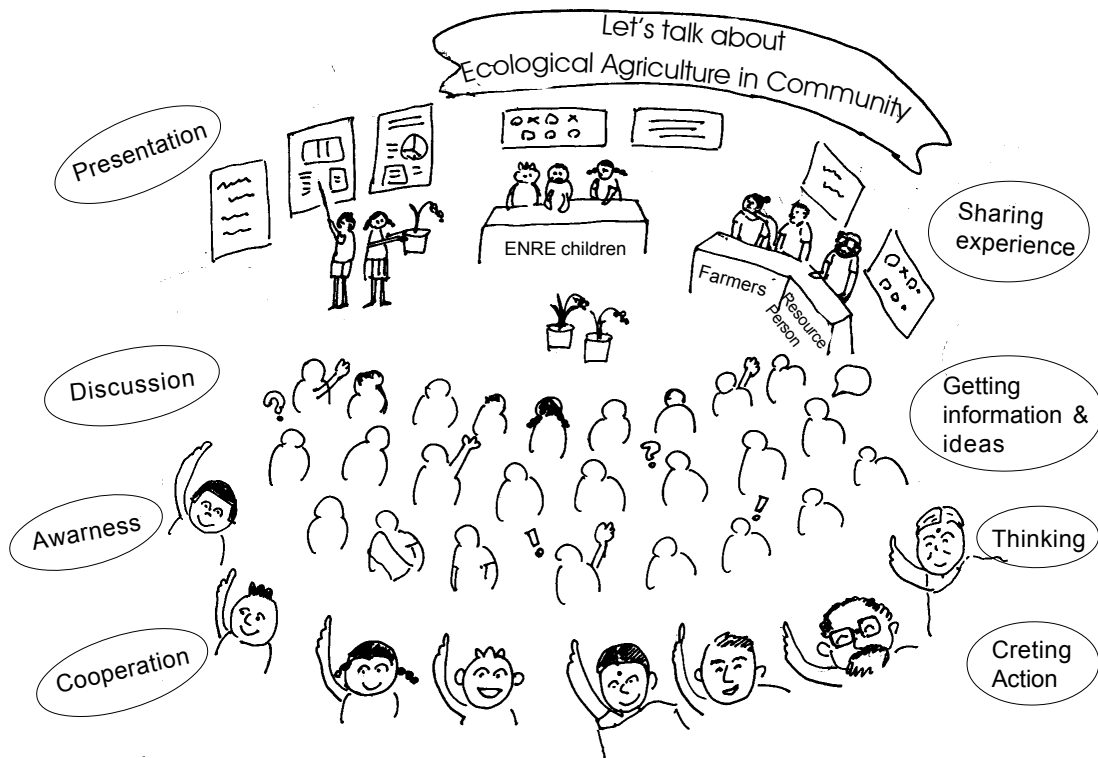
### [Example-2: The observation report on two types of rice fields]

	পক্ষেতে রাসায়নিক ব্যবহার করা হয়	পক্ষেতে রাসায়নিক ব্যবহার করা হয়না
Sketch		
অন্য আরও কি কি জীব দখা গেছে (প্রাণী, গাছ-গাছড়া)	প্রাণী : ----- গাছ-গাছড়া : হিঞ্জে*, কলমী* *(শাক হিসাবে খাওয়া হয়)	প্রাণী : ----- গাছ-গাছড়া : -----
ছাত্রছাত্রীদের মতামত ও চাষীদের মন্তব্য		



### Take action in community

- Start 'School organic rice field ' with help from local farmers who grow traditional variety
- Organizing Mini symposium in your community to spread the message about organic farming and environmentally friendly agriculture. Ask local farmers and experts to participate as resource persons. Children can also make their presentations what they have learnt through their activity. This is a good opportunity to learn together about 'Sustainable Agriculture'. Invite community members and other school children for this symposium. (see Teacher's note)



Various Inputs

## Teacher's Note

### Sustainable Agriculture and Environmental Education

(by Ardhendu S. Chatterjee)

In the last three decades farming has become increasingly market dominated. What shall be cultivated in a particular region is seldom determined today by soil, temperature or rainfall pattern. Local need of food & employment have also ceased to be a factor. Modern farmers & majority of researchers and Government officials now a days are preoccupied today with the question: How can maximum money be earned from a given land area in a short period. They are not very disturbed if in the quest for super-profit we end up exhausting our underground aquifers and degrade our soil. If our crop-animal-tree diversity gets lost nothing to worry. Some solution will be found someday, somewhere by some scientist; this is the ardent hope & prayer of 'Modern' age people

The warning bells of danger has been ringing for a long time now, and if we had kept our eyes and ears open, we could have heard them long time ago. It does not need a lot of effort to know that agricultural productivity is falling or is rising at a very slow rate, that land degradation is widespread and pollution & erosion is making many lands uncultivable, that river beds are silted and are losing capacity to carry water-both the incidence & magnitude of droughts and floods are increasing and that forests, grasslands, wetlands and the diversity therein are rapidly diminishing.

All the farmers are aware today that bees and other pollinators don't visit their fields & orchards anymore. Farmers who have to get up before sunrise and hand pollinate cucurbits [i.e. cucumber family crops] must be keenly aware of this problem. Both farmers and the FCI godown managers I am sure are also aware of increase in the number of rats & mice's, as owls & other predator birds who hunt them have been exterminated. The landless labourers & farm workers who depended a lot on collection of edible weeds, fishes-crabs-shrimps etc from the rice fields and adjacent wetland must be very much aware of decline in their availability. (This is probably why the incidence of malnutrition among the poor has hardly changed, despite rapid increase in national foodgrain yields and operation of a public distribution system.) Access to forests, grasslands, wetlands and other common property resources was an insurance policy against periodic shortages, which has now lapsed.



*An example of Integrated rice field by digging trenches around it*

Population pressure on land & water resources is partly responsible for degradation of natural resources and ecosystems but present farming system is the main culprit. This system promotes monoculture over vast areas and is based on the use of high response & hybrid seed varieties that cannot be cultivated without regular supply / application of irrigation water and synthetic agrochemicals. This system has not spread by itself. This life threatening, environmentally damaging farming system has been promoted through subsidies on irrigation, subsidies on agro inputs soft loans from banks, free distribution of seeds / minikits, publicity campaigns by university & agricultural department staff etc. All this has been justified in the name of poverty reduction, elimination of hunger &



malnutrition etc. What is essentially commercialization & industrialization of agriculture has been labeled as scientific progress/ technical revolution etc. to silence the critics.

Our farming system now is suffering from deep crisis and those who are engaged in farming, train farmers or think about agro based education or environment / biodiversity issues must think together to search for & develop alternative farming systems which are sustainable.

Sustainable farming implies increase in diversity of plants, animal, birds etc and also the creation of a wide variety of habits, sustainable agriculture means integration of various productive elements in a farm so that nothing is wasted and dependence on external inputs is reduced. Each garden/ farm is designed in such a way that human needs can be met without severe degradation of natural resources. Locally produced, utilization of non-renewable resources are minimized and mainly biological resources / renew able water & energy source are utilized.

If we convert a conventional rice field to this kind of diversified – integrated (or ecological) farm by digging a small pond and shallow ditches or trenches around it and using the excavated soil to construct wide high bunds on which fruits trees are planted. If vegetables are grown on slopes of embankments and vine crops along the ditches are allowed to climb over high frames / trellises extending over the ditches / pond, if a few chicken duck or pigs are raised in small houses projecting over the water, if fish, duckweed, azolla etc are raised in the pond then farm households income will rise and risks will be reduced. This kind of farming reduces the need of agrochemicals and thereby reduces soil & sound scientific principles. Only problem is this kind of farming needs a good management plan, regular monitoring and community cooperation.

Help your students to understand that use of factory manufactured purchased input is not indicator of modernity. Science is not driven by greed for money. Greed for knowledge, quest for a better live should govern scientific enquiry. Dominating nature is not goal of science; understanding principles of nature and utilizing them for solving human problems, meeting societal needs are the tasks for scientists.

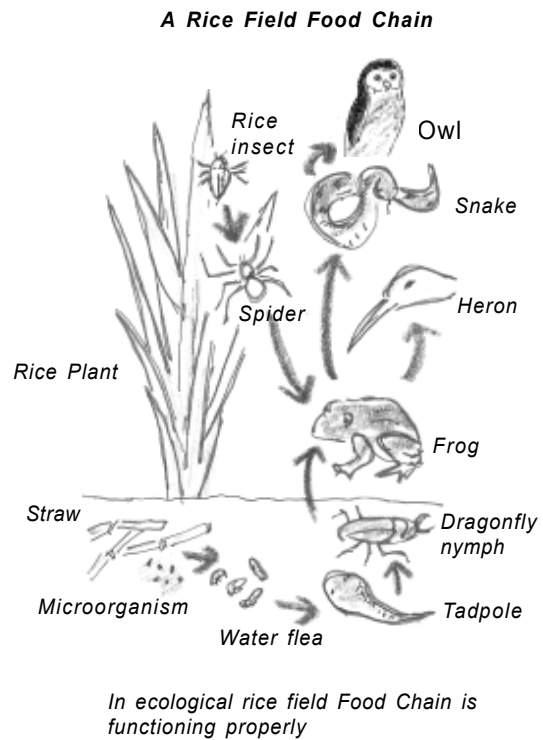
Even a small household garden can be redesigned ecologically so that around the year 10-12 types of fruits & vegetables can be harvested, some herbs & medicinal plants, some flowering plants are also available some birds are raised, some fish are reared in a pond or large container/pitcher and all these together ensure better nutritional status as well as create a learning environment for family members. To design such a garden it does not cost much money, all that is needed is some attentiveness, some willingness to work with own hands, some habit of collective reflection & action.

If we enhance soil fertility, reduce the incidence of pests & diseases we must choose plants and varieties that are adaptable to local soil & climate and practice mixed cropping, crop rotation, green manuring etc. We need to learn how to prepare and use bio-fertilizers, vermicompost, botanical repellents and bio-pesticides etc.



*'Catching fish for today's meal .... ' Traditionally rice fields have been diversified food source because agrochemicals were not used so much like today*

To do this kind of ecological design we need to become familiar with local trees, insects, birds, animals etc. We need to understand their requirements, productive capacities, roles & functions etc. Which insects and birds are friendly to farmer? Which plants grow fast without much care & attention? Which food are more nutrition's? Which plant extract can be used as medicine or can be used for plant protection? These questions can be investigated as part of environmental awareness. All of us need to learn how to observe, How to conduct scientific experiment, How to analyze data collected and arrive at a conclusion? These are essential skills for science workers, and creating / nurturing these skills/ habits is the goal of the ENRE project. Let us work together with students to create the foundations of alternative farming system & societal relations.



## Feedback

### Step 3 – Activity (B)



Through this activity children observed 'rice field ecosystem' in own locality. How much agrochemicals are used among farmers in your area? If children are aware that healthy rice field, which are cultivated organically, has various kind of living creatures and produce other food stuff; then this can be a good starting point for promoting ecological agriculture and sustainable agriculture in the community.

### Feedback Summary

ENRE Partner organization (District)	Swanirvar (North 24 Parganas)	Swanirvar	Swanirvar	Swanirvar	Kajla Janakalyan Samity (East Midnapur)	Vikramshila (Bardhaman)
<b>Village</b>	Beliakhali	Bajitpur	Kolsur	Gokulpur	Parulia	Bigha
<b>School/ Group</b>	Suprobhat Sangha	Kachari group & Majher group	G.D.S	Village Development Centre	Parulia Mother Teresa KKB	Bigha Vikramshila School
<b>Group</b>	22 children (13 boys, 9 girls)	14 children (4 boys, 10 girls) 17 children (12 boys, 5 girls)	25 children (13 boys, 12 girls)		15 children (10 boys, 5 girls)	3 students
<b>Children</b>	Class 4 - 9	Class 5 - 10	Class 5 - 8		Class 7 - 8	Class 6 - 8
<b>Teacher</b>	Abul Kalam	Sudip Kumar Mondol & Kankar Kr. Gain	Subhankar Bhabuk	Tarun Mondol		Arun Kumar Shai, Atanu Kundu
<b>Activity duration</b>	03.06 – 15.08.2002	-	21.04 – 03.09.2001	01.12.03	Apr-Jun, 2003	Participated ENRE exhibition Jan, 2003

## Results

### Information Collected from Local Farmers

- 25 children (class 5 - 8) of GDS school (Kalsur village, Swanirvar) developed the questionnaire by themselves and visited field and collected information from 5 farmers.

Children understood also from their observation that ducks do very useful work for rice field. They paddle and plough soil from rice, they give fertiliser through their droppings, they eat insects which affect rice. They also produce eggs and meat.

### Summary Information

Interviewed by (Name of student)	Rakesh Parui	Ranjit Nath	-	Shusobhon Mondol (c-8)	Shubhojit Bhabuk
1. Farmer's Name	Sudhir Parui	Adhir Parui	Sundal Halder	Showbunath Mondol	Protap Bhabuk
2. Cultivation land (Bigha)	7	2	4 bigha & 18 katha	3	10
3. Rice field (Bigha)	3	2	3 bigha & 12 katha	3	5
4. Vegetable field (Bigha)	4	-	1 bigha & 8 katha	-	2
5. Variety of rice being grown	Minikit, Chinese, Ratna,	Minikit, Chinese	Roshi, Minikit, Khatish, Tuli, Swarna Masuri, Hybrid (F)	Minikit, Joya, Masuri	Minikit, IRR1
6. Which Vegetables being grown	Cauliflower, Cabbage, Pointed gourd, Egg plant (brinjal), Taro, Potato, Cucumber, Mustard, Coriander	-	Hyacinth bean, Egg plant, Bean	-	Brinjal, Pointed gourd, Chili
7. Applying Farm Yard Manure	Yes	No	No	Yes	Yes
8. Applying Chemical Fertiliser ? (Name)	Yes (Urea, potash)	Yes	Yes (Urea, Phosphate, Sufala, Potash, Aluminium, Macheffy*)	Yes (Urea, Phosphate, Potash, Sufala)	Yes (Urea, Phosphate, Sufala)

9. How many time per year applying compost ?	1 time	-	-	1 time 5 quintal	1 time
10. Are you keeping the balance sheet for cultivation ?	Yes	Yes	Before not, but now keeping for Sheem production	Yes	No
11. Production of rice (Bosta / Bigha)	12 Bosta	Rs. 1,000	15 Bosta	28 Bosta	10 Bosta
12. Liquid Manure used ?	No	No	Yes	No	No
13. Pesticides used to control pests ?	Thiodan, Potashum#, Basathrin, Surathhasin, Vitamin#, Milkaran, Umar, Serin, Bulukovar, Jegsthin	Phorate, Dimecron, Karan	Quinalphos#, Dimecron, Thiodan, Basatin, Tetaphin, Metacid	Dimecron, Hinson, Thiodan	Bhemiklon, Malevon, Bhiomethin, Quinalphos#

Machetty \* is herbicide not fertilizer

# Those are not pesticides (by ENRE)

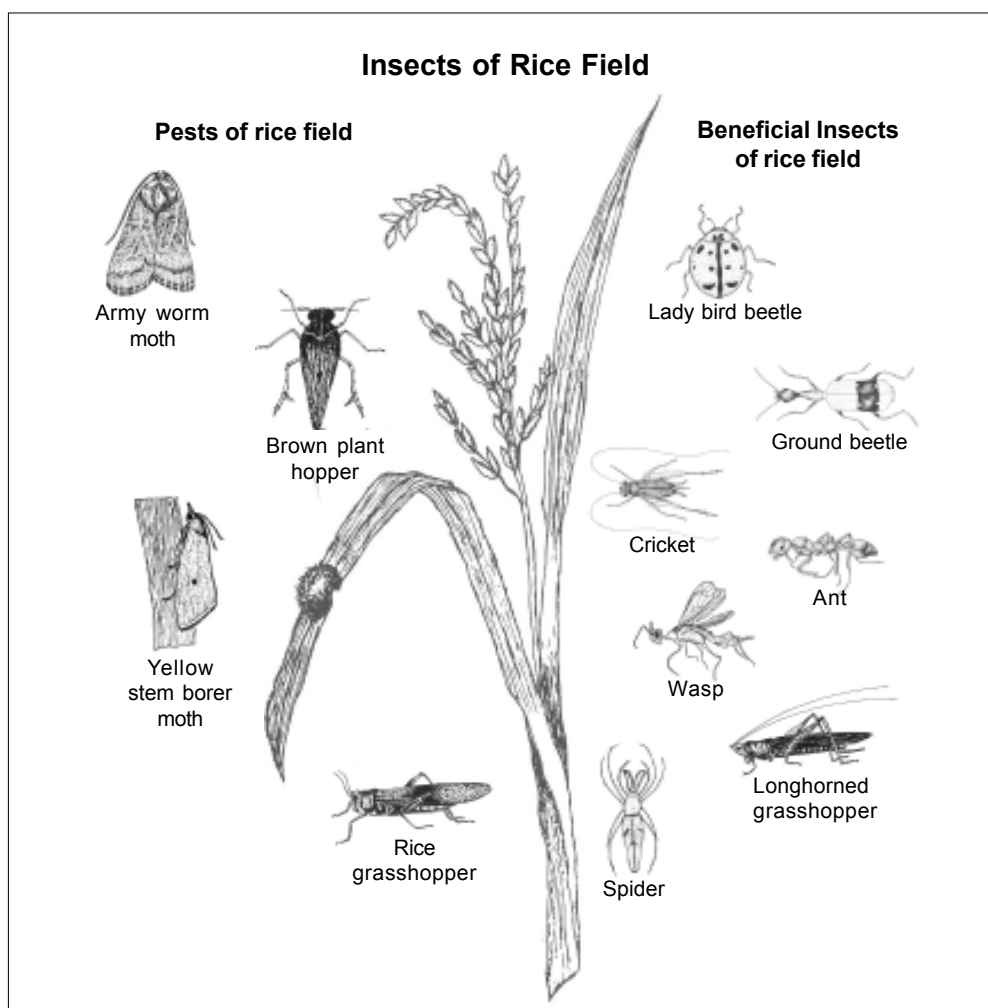
- Information collected by group of 'Village Development Centre' (Gokulpur village, Swanirvar)

Surveyed on 01.12.2003

Variety of rice	Aaus Chinese, I-T, Joya	Aman Swarna Gotorra Masuri, Pankaj Ashpal, Sonamukhi, Kamai	Boro IT, Minkit, Gotorra, Chinese, Indrojit
Growing by own	8 farmers	4 farmers	7 farmers
Buying from market	2 farmers	6 farmers	3 farmers
Why various kind of rice are grown ?	To increase production	To increae production. Lower availability of canal water.	Production is much more
Why the traditional variety of rice are lost ?	Less production	Unsteady water level of rice field	Lower production
Why new variety of rice are grown ?	Traditional variety are not available, new variety products are more	More production, Less growing duration	More production, Less growing duration

What kind of pest / disease problem for rice ?	Rice stem borer (Majra), Shakhi, Jhai pora, Pachla	Majra, Shakhi, Pachla	Majra, Current poka, Pochla, Jhaipora
What kind of pesticides are used ?	Shumidon, Phirodon, * Idon	Shumidon, Padan, * Thiodan, Nonaz, Phirodon	Taidon, Betathin, * Hestathion, Phorodon
Chemical Fertilizer ?	Urea, Potash, Salpht, Phosphet	Urea, Potash, Salpht, Phosphet, Shuphola	Urea, Potash, Salpht, Phosphet, Shuphola, DAP
Quantity of Water ?	4 hours / Bigha	By rain water	30-35 hours / bigha
Expenditure	Rs. 1,100 / bigha	Rs. 1300 / bigha	Rs. 2,000 - Rs. 2,500 / bigha

\* The names are mispronounced, we have deliberately retained names used locally.



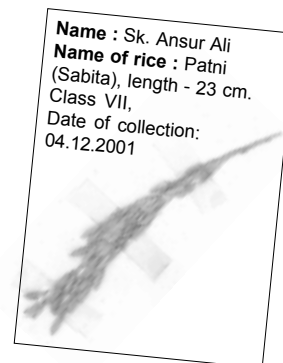
(By ENRE) reference 'Rice-Non Chemical Pest Control' / CIKS

Rice type	Aman	Boro
Rice Variety	1. Hawaii, 2. Aashpali, 3. Lal kamini, 4. Marichishaal, 5. Tilde kochuri, 6. Hiji, 7. Sabita, 8. Jalabari, 9. Bhuder, 10. Suresha, 11. Saruno, 12. Banglades Patnai	1. Minkit, 2. 1444, 3. Gethira, 4. Ratna
What kind of pest problem ?	Rice stem borer, Brown plant hopper, Shankhi	Majra poka, Shoshok poka, Jab poka (stemborers, BPH, Aphids)
What kind of disease problem ?	Rice plant become brownish colour and fell down, Plant stem is spoiled	Brownish colour and fell down, Plant stem is spoiled
What kind of pesticides are applied ?	Sumidon, Hostacion, Kinadon, Copper sulfate (Tute), Dimecron	Sumidon, Hostacion, Kinadon, Dimecron
What kinds of chemical fertilisers are applied ?	(per bigha) Urea 15kg, Phosphet 15kg, Potash 10kg.	(per bigha) Urea 50kg, Phosphet 50kg, Potash 25kg.
From where seeds coming ?	1. House, 2. Do, 3. Do, 4. Do, 5. Do, 6. Block/shop, 7. Do, 8. House, 9. Block/Dokan, 10. House, 11. Block/shop, 12. House	Block/Shop
How much water needed for cultivation ?	Rain water	Per bigha, 40 hours irrigation *
Why are you growing this variety ?	Yield is much more and insect problem is less. Suitable for land and water situation.	Yield is much more and insect problem is less, growing period is short

Aaus rice – this type of rice are not grown any more in our area.

(\* see more information in 'Expert View Point' on page 84)

- Swanirvar group has also their summary feedback. They have done survey with 115 farmers in 7 villages in September 2002. Children made Rice Variety Collection Sheets too.





## Information Collection on Rice Production

- A group of Bajitpur village (Swanirvar) collected information from farmers regarding yield of rice.

'Summary data of the yield of 'Boro rice' in our area' (information collected from 12 farmers, data of rainfall and temperature attached) 11.10.2003						
Year	Rice Variety	Yield/Bigha	Temperature & Rainfall *			
			February	March	April	May
2002	1444	8 sacks	29 - 17	35 - 22	48 - 29	39 - 26 (130 mm)
2001	1444	9 sacks	31 - 13	35 - 20	38 - 25 (19 mm)	38 - 24 (41 mm)
2000	1444	10.5 sacks	27 - 17 (45 mm)	33 - 18 (15 mm)	36 - 23 (47 mm)	38 - 23 (158 mm)
1999	1444	11.5 sacks	32 - 14.5	35.5 - 19	38.5 - 23	38 - 24 (171 mm)
1998	1444	12	No data			
1997	1444	14	No data			

\* Remark from teacher's report : ' Children learn the relation between cultivation and climate from the school text book. Usually they memorize the fact of the situation in India, different states, and other countries. But they do not know own local situation. Therefore we encouraged children to keep record of temperature and rainfall for last 4 years related to rice cultivation.'

Note : The data suggests the yield is decreasing year by year (By ENRE)



- Students of Parulia village (Parulia Mother Teresa KKB group / Kajla) collected information from farmers and calculated expenditure and profit on rice farming for both Boro and Aman cultivation.

(In original report it is not clearly mentioned the profit is per what unit / ENRE)

	Boro rice (Lal shankar)	Aman rice (Gitanjali)
Expenditure (Rs.)		
Ploughing & levelling	240.00	200.00
Basal fertiliser application	400.00	(no cost, by using cowdung)
Labour for transplanting seedling	700.00	840.00
Second fertiliser (top dressing)	200.00	-
Pesticide / herbicide etc	500.00	-
Labour for harvesting	280.00	350.00
Threshing & winnowing	210.00	350.00
Irrigation (contract basis)	1,200.00	-
<b>Total</b>	<b>3,770.00</b>	<b>1,740.00</b>
Income (Rs.)		
Paddy	(30 Maunds) 4,500.00	(16 Maunds) 2,400.00
Straw	500.00	640.00
<b>Total</b>	<b>5,000.00</b>	<b>3,040.00</b>
<b>Surplus</b> (Income - Expenditure)	<b>1,230.00</b>	<b>1,300.00</b>

[Teacher's report from Parulia village]

Based on their calculation, the children found out .....Comparing High Yield Variety (HYV) and Traditional variety (TV), the productivity of HYV is much more than TV. Though the income from HYV is much higher than TV, the surplus income generated made by both variety is more or less same, since HYV cultivation requires much more expenditure than TV. Children thought therefore farmers could cultivate more TV, and not use Chemical fertilizer but organic compost. After discussing their result with 12 farmers, farmers agreed children's point and they said they would try to use cow dung compost instead of chemical fertilizer.



## Other things children found out from interview with farmers

### On Traditional Variety of Rice

- To know the reason why many local /traditional varieties of rice are not grown any more, children asked 10 old farmers (age 50-90). [Beliakhali village]

Opinions from farmers

1. Previously local varieties of rice were grown by rainwater in rainy season. Almost every year we had flood and the crop was destroyed
2. Low productivity per unit of land
3. Hybrid seeds are easily available now
4. Traditional variety of rice takes longer to mature
5. They require more labour, too.

- From the collected information farmers children summarized the following points on the traditional variety rice and our health [Beliakhali village]

- a. Local /traditional variety requires less or no use of chemical fertilizer and pesticides. Therefore traditional varieties are;
  1. More organically grown
  2. Less environmental problem
  3. No pollution for water,
  4. No pollution for soil of vegetable field,
  5. Fish culture is possible in rice field
- b. Traditional variety is usually cheaper and good for our health, because they contain no poison. When we think about health, eating safe food is more important than taking nice looking and costly food. We do not need expensive food but we need safe and healthy food.



## Children's experience for sharing information

- 'Sampad' (meaning 'Wealth' in Bengali), a group of Bigha Vikramshila school had presentation about the rice culture in own village Bigha, Bardwan district, in the Eco-Work exhibition organized by ENRE in Jan.2003. Three students (Selim Shek, Rajkumar Majhi, Mannan Shek, Class 6-8) represented their group on the presentation.

They made presentation and talked about ;

1. Different kind of rice and cultivation
2. The result on survey with 20 farmers
3. Most of their local people are involved in agriculture
4. Variety of rice grown in their area -> 17 variety
5. Rice cultivation in past and present
6. Yield of rice in past and present
7. The description of each variety of rice
8. Calculation on the profit and loss in rice cultivation
9. Problem of using chemical fertilizer/ pesticides
10. The reason why traditional variety of rice are not grown any more



(The rice variety appeared on their chart — Lal Sharna, Kalam kati, Jhinge Saal, 36, shada Sharna, Chorui mukhi, Jola aman, IR 64, IR 36, Kotok 36, Nera boro, Dayar Mudhina, Bullet etc.)

The group made several types of paddy packets (variety of Rainy season rice, Boro, Low land rice, etc.) and put on the chart alongwith description of each rice and how to cultivate.





## Sharing Ideas

The survey results show us that all farmers, whom children interviewed, are using chemical fertilizers and pesticides for growing rice and vegetables. Unfortunately it seems it was difficult for children to find out organic rice farmers in their locality. But this reflects the general agricultural situation in this country (wherever irrigation facilities are available).

We can find many newspaper articles stating how our food crops are cultivated unsafely nowadays. Let's have a look some points in those.

[Telegraph / 6 Aug, 2001]

- In last 50 years production of food grains in India jumped from 51 million tones to 206 million tones by using higher doses of fertilizer and pesticides, alongwith expansion of irrigated area.
- Crops are grown by 90,000 tones of around 140 odd pesticides every year
- 75 % of food and vegetables samples (from Delhi, Bihar, UP) tested contains significant level of pesticides (much higher than permissible limits)
- IDRC data shows, ... India accounts for 1/3 of pesticide poisoning report from the developing countries.

[Telegraph / 6 May, 1999]

- Certain vegetables are sprayed with pesticides when they reach warehouses to improve their looks. Eggplants are treated with carbofuran to get the dark purple color that buyers prefer. Okra is treated with malathion just before it is taken to the market to produce the right shade of green. Tomatoes are similarly sprayed with chemicals to protect them against blemishes. Interestingly, most farmers know the hazards of pesticides well. They grow their own food, without pesticides, in separate kitchen gardens.
- India has second highest rate of pesticide consumption in Asia, exceeded only by Japan. In the past decade alone, Indian pesticide consumption has doubled to 100,000 tones. Andhra Pradesh has the highest usage of pesticide, followed by Punjab.

The articles say one of solutions lies in integrated pest management and they claim necessity of agricultural way, which is environmentally sustainable as well as yield-increasing.

We feel that it is teachers and educator's duty to nurture future farmers and consumers, who care about healthy environment and safe food. We hope that the kinds of activity described in this booklet can help for both teachers and children to take one step closer toward developing sustainable environmental friendly agriculture and community life.

*Farmer who practices IPM (Integrated Pest Management) checks beneficial insects & harmful insects in his rice field.*

*If he finds the number of beneficial insects are much more than the pest, he does not need to apply any chemical/ botanical pesticide in his field.*

*We can understand the natural balance of eco-system is the best pest management.*



Photo from SAN Project, DRCS

List of Rice Varieties  
Appeared in Children's Feedback



### List of Rice Varieties that Appeared in Children's Feedback

No.	Name of Rice	Type (H,T)	Cultivation (Aaus, Aman, Boro)	Feedback from groups of different villages											Pb/R	Remarks
				a	b	c	d	e	f	g	h	i				
01.	Akundi	T	Boro			○										↓
	Anonda		Boro								●					
	Amon						●									
	Arjun Saal	T		○	○											×
05.	Ashpali	T	Aman		●	○	●									↓ S
	Assam Mota					●										
	Balamsur											●				
	Bangladesh Beri		Aman		●	●										
	Basmati	T		△	●											↓
10.	Beri	T		○	○											×
	Bhuder		Aman			●										
	Bhunri											●				
	Boro Shankar	H														
	Bota Dhan	T				○										
15.	Boye	T		○	○											
	BR 11	H				●										
	Bullet															
	Chinese		Aman / Boro	△	●		△									
	Choto Shankar		Boro								●					
20.	Churui Murkhi											○				
	Dayar Mudhina											●				
	Dhan Siri	T		○	○											×
	Dhulobichi	T				○										↓
	Dighal	T				●										↓
25.	Ganga Kaveri		Boro								●					
	Gobindo	T		●												
	Gobindo bhog	T				●	●					●				↓ S
	Gotora / Gethira		Boro					●								
	Gora Aman	T										○				
30.	Goradhan	T														

				a	b	c	d	e	f	g	h	i		
	Hamai	T	Aman		•	•		•					Pb	
	Hiuji		Aman			•								
	Hogla Vethe	T				○								↓
	Indrojit	H	Boro					•						
35.	IRA	H									•			
	IR-8	H		△										
	IR-36	H	Boro, Aman							•	•	•		
	IR-64	H	Boro								•	•		
	IRRI	H					•							
40.	It /IT Minikit	H	Boro					•						
	Jabra	T		△	•									↓
	Jagannath	T				•								
	Jinge shaal	T	Aman								•	•		
	Jolla hori		Aman			•								
45.	Jola											•		
	Joya Aman						△							
	Joya Aush							•						
	Kalakochu	T												↓
	Kalam Kati	T										•		
50.	Kas Dhan											•		
	Katarangi	T		○	○	○								× ↓
	Kejur chori	T				○								↓
	Keyrshali	T				○								↓
	Khitish	H		△	•		•							
55.	Kotok 36	H										•		
	Kumar gore	T				○								↓
	Lakhi	T				○								
	Lakshmi											•		
	Lakshmi Dighal	T		•	•									↓
60.	Lal balam	T				○								↓
	Lal Kamini	T	Aman		•	○								↓ S
	Lal Patnai	T			○	○								↓
	Lal Sharma	H									•	•		S

			a	b	c	d	e	f	g	h	i	
	Lal Shankar	H	Boro						•			
65	Lathi saal	T		○	○							x
	Masuri	T ?	Boro, Aman	△	•	•	•	•		•		Pb, R ↓
	Matchaal	T			○							
	Meghi	T	Aaus, Aman	○	•	•					○	x ↓ S
	Minikit	H	Boro	△	•	•	△			•		
70	Morich Saal	T	Aman			○						↓
	Mota Dhan	T				○						↓
	Nagra Peshari	T		○	○							x
	Natra											
	Nayanmani	T								•		
75.	Nayantara		Aaus					•				
	Neer										•	
	Nera boro										•	
	Nera-Kero											
	Nileymoti	T		○	○							x
80.	Noon surat	T		○	○							x
	Nutan dhan				•							
	Padma	T		○	○							x
	Pala jore (jere)	T		○	○							x
	Pankaj	H	Aman		•	•	•			•		S
85.	Paranghi	T		○	○							x
	Parijata	T	Aaus							•		
	Patharkuchi		Boro						•			
	Patnai (Patni)	T	Aman	○								x
	Patnai 23	H					•					
90.	Patnai peshari	T			○							
	Piple kele	T		○	○	•						x ↓
	Pumi	T			○							
	Radhuni pagla	T			○							
	Ranjit	T	Boro						•			S
95.	Ras sita										•	
	Ratna	H	Boro		•	•	△					



			a	b	c	d	e	f	g	h	i	
	Roshi		Aman	△	●		△					Pb
	Rupa									●		
	Sabita	H	Aman		●	●				●		
100.	Sada Sharna	H									●	
	Sharna	T ?	Aman		●	●	△					
	Sharna gotora	H	Aman					●				
	Sharna masuri	H		△	●		●					
	Sharna mukhi		Aman					●				
105.	Shoru patnai	T			○							↓
	Sua kalma										○	
	Suresh				●							
	Tilak kochuri	T	Aman		●	●						
	Tulasi	H				●						
110.	Unnat kur									●		
	Uri	T		○	○							x
	36	H									●	
	75	H	Boro						●			
	1000-10	H			●							
115.	1000-9	H								●		
	1444	H	Boro		●	●						Pb

H – High Yielding Variety; T – Traditional Variety; Pb – Parboiled; R – Raw rice;  
( T – information from childrens' feedback; T – information added by ENRE)

a. Swanirvar - Chandal atty; b. Swanirvar - Beliakhali; c. Swanirvar - Bajitpur;  
d. Swanirvar - Kalsur; e. Swanirvar - Magul khali; f. Swanirvar - Gokurpur  
g. Kajla - Parulia; h. Kajla - Hinchij; i. Bardhaman

● Growing at present    ○ Grew before    △ Eating    ↓ Decreasing    × Lost  
S Seeds in DRCS



# MEMO PAGE

## *Resources*



*to strenghten your guiding role*

# The Multiple Dimensions of Rice

Ardhendu S. Chatterjee



Rice is a cereal food plant of the grass family called gramineae, and is the staple food or main source of energy for almost half of the world's population, who live in tropical Asia & Africa.

Rice is grown mostly in humid coastal lowlands and deltas of the tropics and prefers a warm climate (24°C - 25°C), and neutral to acid soils (pH: 5.0-7.5). However, some varieties of rice are grown in terraced paddy fields high in the mountains of Nepal (Sea level to 2600m) and in the temperate zones of Japan & China during the summer months.

In the wild, there are many kinds of rice, but most of the cultivated rice belongs to the species *Oryza sativa* (Common Asian rice). In Western Africa & some other areas *Oryza glaberrima* sp. is cultivated. It is estimated that about 7-8000 years ago *Oryza sativa* was domesticated in Asia. *Oryza sativa indica* with long, thin grains was brought under cultivation in South – South East Asia, probably somewhere in India, Myanmar, Thailand triangle & the *Oryza sativa japonica* with shorter grains, adapted to cooler climates was perhaps domesticated in China & Japan around the same period. Over the next thousands of years farmers of Asia had discovered or developed more than 3,00,000 varieties suitable for special soil & climate, or for a special purpose, or for a particular location. Rice was grown in lowlands & uplands; dry areas & flooded plains; in summer, rainy season & winter season. Some varieties were only 90 cm tall, other could grow more than 2m high; some rice was quick maturing. Only 60 days after transplanting seedlings they were ready for harvest, other varieties took twice or thrice that period. The history of rice has been history of civilizations, history of innovativeness & of scientific investigations by millions of farmers. Today when science & technology is becoming more & more institutionalized and the institutions are increasingly becoming commercialized, reminding ourselves of the indigenous knowledge & traditional wisdom associated with rice cultivation & associated soil & water conservation practice may be highly valuable.

Not so long ago most Asian people lived in villages and the rural life revolved around rice calendar. There were ceremonies for every stage of growing harvesting & storing rice, in Bengal, in Kerala, in Tamilnadu, in Chhattisgarh etc. Ploughing, planting, and harvesting rice was celebrated across religion, ethnicity and language, in Indonesia, Japan, Korea, and Thailand. Rice seeds were used in birth, marriage & death ceremonies. Rice was part of art, music & literature. In Sanskrit and in many languages of India (as well as several

Asian languages) the words for rice & food were one & the same. In Sanskrit rice is called 'anna'- Something that sustains/ nurtures life.

The paddy seeds enclosed by bran & husk is known as : '*Dhanya*' (Dhaan in colloquial Bengali language) de-husked paddy is called '*tandul*' (chaal or chaul) and Cooked rice is called '*anna*' (Bhaat). Every part of the rice plant was used, often in more than one way.

### Many Uses of Rice Plant, Many Functions of Paddy Fields

Traditional rice fields yielded much more than paddy grains. The rice plants yielded food for humans, for cattle, for fish, chicken & pig. Straw & rice hulls were used in house construction, as insulation, for paper making, as fuel etc. From the paddy-fields many edible aquatic weeds were collected, many varieties of fish, shrimp, crabs, frogs, snails/ oyster were available in & around paddy fields. The paddy-fields or rice fields provided food & resting place for wide variety of ducks, herons & other birds, which kept pests under control.

Rice fields also used to provide us with a wide variety of environmental services. In tropical monsoon climate like ours 70-80% of annual rainfall is concentrated over 8-10 weeks, or rather 35-40 days. This can cause massive soil erosion & flooding. The rice fields acted as gigantic shallow dams, storing millions of liters of rainwater, controlling flash floods & helping to recharge the ground water through seepage. The nation benefited immensely from the joint effort of the paddy farmers provided totally free of cost. In many parts of India farmers had developed excellent networks of ponds, bunds and water harvesting structures, sometimes with and mostly without help from the state authorities and formal experts. Groups of rice farmers maintained the dykes and channels mostly through voluntary labour .

#### Rice-Plant Classification

<b>Kingdom</b>	<b>Plantae (plants)</b>
<b>Sub Kingdom</b>	<b>Tracheobionta (vascular plants)</b>
<b>Superdivision</b>	<b>Spermatophyta (seed plants)</b>
<b>Division</b>	<b>Magnoliophyta (flowering plant)</b>
<b>Class</b>	<b>Liliopsida (monocotyle dons)</b>
<b>Sub class</b>	<b>Commelinidae</b>
<b>Order</b>	<b>Cyperales / Poales</b>
<b>Family</b>	<b>Poaceae (Grass family)</b>
<b>Genus</b>	<b>Oryza</b>
<b>Species</b>	<b>Oryza sativa (rice)</b>



#### Rice ecosystems (according to IRRI, 1991)

	<b>Area</b>	<b>Production</b>
Irrigated Rice	54 %	76 %
Rainfed Lowland rice	25 %	18 %
Rainfed Upland Rice	9.2 %	3.8 %
Flood prone Rice	8 %	4 %

(Total Rice cultivated area globally - 148 million ha )

### Grain Yield Increases, Total Food Decreases, Environment Degrades Rapidly

In the last four decades, the yield of rice per hectare has increased more than threefold by introduction of the 'Green Revolution' package; based on the use of dwarf and semi-dwarf high response varieties of quick maturing seeds, along with regular application of a wide range of synthetic chemical fertilizers and pesticides/herbicides/rodenticides etc. The cultivation of these modern varieties spread in selected regions with the help of state financed & owned large dams, irrigation channels and deep tube-well based irrigation systems. Irrigated rice cultivation was started in semi desert areas with massive dams and canals (though thousands of village homes and millions of hectares of forests & farms were destroyed by these mega projects, and millions of hectares of fertile land in Punjab, Haryana and Western U.P. eventually became waterlogged, saline and unproductive.) Later, shallow tube wells have been introduced, and were owned mainly by well-off farmers. Irrigated HYV/HRV rices are now grown mainly in dry season, resulting in reduction in land area cultivated with pulses / legumes, oilseeds and minor millets. Hardly any trees and shrubs can be seen today around the rice fields. A few varieties of rice cover large areas, inviting new pests and diseases.

Rice today has become just another commodity, and the high-yielding rice fields have become a source of disease & death. Each kilogram of rice grown in dry season needs 3,500-5,000 liters of water and as the acreage under post monsoon 'boro' rice has rapidly expanded with incentives & subsidies from state & private institutions (because it is this rice that needs most the application of synthetic fertilizers & pesticides which translates into profits for agro business corporations who exercise monopolistic control over seeds and all agricultural inputs and because our development establishment, research facilities and extension services have also become dependent on revenue from sale and distribution of agrochemicals) supply of both safe water & food has become endangered.

Today the rice fields deplete groundwater instead of recharging them. Today the rice fields don't clean organically polluted water. Instead they pollute surface and ground water with nitrates, chlorides, heavy metals, pesticide residues and other chemicals. The biocides sprayed in a rice field today have almost decimated crabs, shrimps, frogs, fish etc. which used to be source of free food for the rural poor, and have severely reduced earthworms, honeybees and beneficial insect population as well as the diversity of micro flora and micro fauna that keeps topsoil healthy and fertile. Use of heavy machineries consuming petrochemicals has also contributed to pollution, reduced energy efficiency (input output ratio) of agro ecosystems, and has escalated import bill and consequently added to the burden of foreign debt.

### Malnutrition and ill-health Still a Major Problem

Meanwhile in our food self sufficient and exporting nation, millions still go to bed hungry! Almost half the families in rural India cannot afford two complete meals a day even when the rains are normal, situation becomes much worse when there is drought or flood or both. [This has become common due to silting of our waterways and reservoirs.] Malnutrition among children is directly and indirectly the major cause of infant mortality. Lack of food is not the only problem, the food we eat today are not usually safe.



*Cultivating 1kg 'Boro rice' requires 3,500-5,000 litre of water. This means 1m height of water all over the paddy field needed to be input through the irrigation.*



Time	Festival	Action
<b>Baisakh</b> (Mid Apr – Mid May)	<b>'Akshay Tritiya'</b> [1 day]	Broadcasting seed on 'shole' lands (low lands). Aaush / Aman rice [dry districts]
<b>Asharh</b> (Mid Jun – Mid Jul)	<b>'Ambubachi'</b> [ 7 days ]	Ploughing / tilling stopped (moist districts)
<b>Shravan</b> (Mid Jul – Mid Aug)	<b>'Shandali'</b> (Bankura) <b>'Daligara'</b> (Puruliya) [1 day at end of Shravan month]	Branched of a tree called 'Parashi' planted in rice fields (in dry zone, mainly by Schedule tribal people)
<b>Ashwin</b> (Mid Sep – Mid Oct)	<b>'Jihur'</b> (Puruliya)	Rice plant is ceremonially offered prayer (mainly Schedule tribal community)
<b>Kartik</b> (Mid Oct- Mid Nov)	<b>'Badhna'</b> [several days]	Ceremonially than king cows & bulls, cleaning up cowshed (mainly in dry districts by Schedule tribal community)
<b>Agrahayan</b> (Mid Nov- Mid Dec)	<b>'Nabanna'</b> [no specific day, over a period]	New rice ceremony, Payesh made, now paddy is breaded in various design (most districts of Bengal)
<b>Poush</b> (Mid Dec-Mid Jan)	<b>'Makar'</b> <b>'Pithe Parban'</b> [one day marking end of Poush month]	Storing paddy starts, Prayer offered to Rice plant. 'Laxmi' (Goddess of wealth) puja and various kind of preparations using new rice (celebrated all over Bengal)
<b>Magh</b> (Mid Jan - Mid Feb)	<b>'Haal Puja'</b> <b>'Akhan Yatra'</b> [several days, chosen by lunar calendar]	Various ceremonies offering prayer to plough (starting to till fields) in some districts prayer offered to bullocks also. (Mainly dry zone)

Many of the pesticides used in Indian rice fields [and other farms] are very persistent, the poisonous residues remains in soil & water for a long, long time, and they keep accumulating in the food chain. From rice straw and bran they are passed to cows milk, chicken and duck eggs and meat etc. From insects and aquatic weeds the pesticides are passed on to fishes, frogs, birds etc, and eventually all these poisons stored in fat / oil gets passed on to humans causing various disease and lowering immunity or the ability to fight infections & diseases. Meanwhile mosquitoes breeding in the rice fields become immune/resistant to pesticides.

We have been turning a blind eye to all these problems in the search of higher yields. Since mid'90s even the yields have started declining. In the face of such a deep crisis, bureaucrats as usual are denying that there is a problem, the technocrats admit there may be a problem but deny their own responsibility, and point out that ours is not the worst case ; the politicians want us to believe that this is only a temporary problem & conclude by promising to set up an other enquiry commission , and the large farmers' organizations keep repeating their demand for continuation of subsidies on fuel and electricity for irrigation & on agricultural inputs.

If the present generation does not try to understand the problems associated with the way we farm today, there may not be many options for future generations. I hope as teachers / scientific workers you will encourage the young scientists to identify various problems associated with rice- farming (which is still one of the dominant economic activity in rural Bengal) and to develop and try out various alternatives, with their family members, friends and local organizations. If our 'modern' technology and management systems create five new problems for every old problem solved, the more we succeed the closer we shall be to disaster.

### **In Search of Our Lost Crop Diversity**

One way we can help our farmers is to help them to recover seeds of rice varieties that have become rare in a particular region. Some children have already started investigating the existence of indigenous varieties. Traditionally the primary classification of rice varieties is done by growing season. 'Aus' paddy are relatively quick maturing (their name comes from 'Ashu' meaning immediate) , they were sown in March-April and harvested by July-August, usually in areas where land gets flooded during late rainy season. 'Aman' is the major rice crop ( the name comes from the season 'Hemanta'- post autumn, pre winter) broadcasted in June-July or transplanted in June-August and harvested in November-December or December to January. Aman varieties are usually photo period sensitive, their flowering is triggered by shortening of day length. Many traditional Aman varieties are still cultivated, especially in lowland areas. HYV/HRV varieties are grown mostly by transplanting seedlings in December-February and harvesting in April-June. This is the boro crop that depletes and pollutes water table, destroys crop diversity & increases dependence on purchased agrochemicals, but is liked by many as it gives higher yield/ hectare & generates business for agrochemical companions.

Locally rice names represent different aspects of the cultivated varieties. Some names indicated their harvesting season such as 'Kartik rupshal', 'Aswin Sal' etc. Some names indicated towns or regions 'Patnai', 'Dehradun" are examples. Sometimes names indicated the status of rice 'Badshah Bhog' (food of kings) 'Gobinda Bhog' (food of gods) are examples, these are aromatic varieties fetching premium price. Names often were describing shape/size of the grain 'Soru Patnai', 'Lakshi Dighal' are names of long fine rice, whereas 'Mota Dhan' (fat grain), 'Pipre Kele (blackish grain like ant) 'Lal Balam'

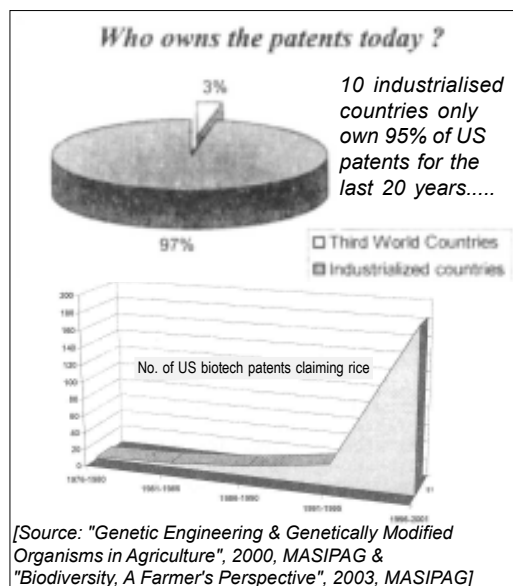
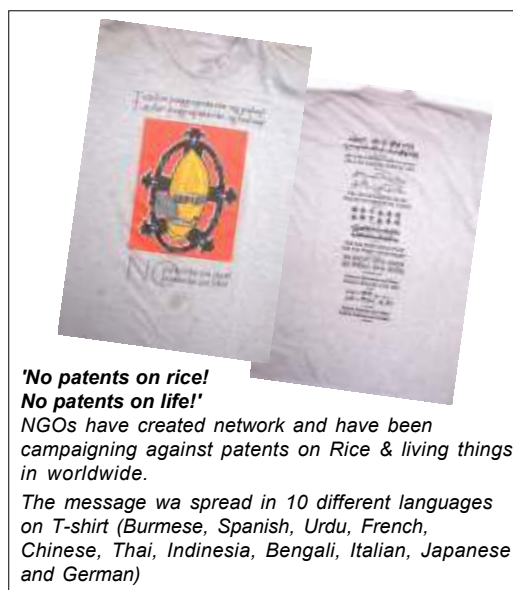


(reddish grain rice) etc. also describe grain type. Names are often graphic 'Radhuni Pagla' is a variety, supposed to have so good aroma that the cook will go mad.

If we can develop a network to collect these rice seeds and information about their special character and can encourage & support farmers to grow even 1-2 rows of these rice on the edge of their fields, we can save some of these rice from extinction, and discover for ourselves whether the high yield varieties really give high yields. Even to develop new HYVs we need to have these landraces available.

### The Seed Pirates Pretending to be Saints

About half a dozen global agribusiness corporations such as Monsanto, Cargill, Syngenta, Hoechst, Sumitomo etc. based mainly in the USA, Western Europe and Japan already control most of the global agrochemical business. Now they want to make farmers dependent on their seeds because the pesticide market is shrinking. They keep promising great miracles with their genetically modified & hybrid seeds (most of which are empty promises, the farmers of India have heard of and seen many miracles, which hardly last 4-5 years); the sweet promises sugarcoat a bitter pill, the multinational agribusiness corporations want to claim patent right over seeds and all living things. Companies in the USA have been trying to patent most of the products that third world countries presently export to their country. They want to make people believe that they have developed special aromatic rice, stealing genetic materials which were given to international research institute often for free. One example is the case of Basmati, in September 1997, RiceTech Inc. of Texas was granted patent No. 5663484 on 'Basmati Rice Grains & Lines'. The patent covered twenty claims; when Indian Government finally protested and some NGOs from India mobilized support of International NGOs and experts, 4 claims were withdrawn. Later the company chose to surrender 11 more claims, before they could be reexamined. In August 2001 the US patent office granted patent for Texmati, Jasmati & Kasmati brandnames and protests have already started in Thailand whose Jasmine rice exports to USA are likely to be hit. The World Trade Organization is pressurizing our governments to respect the patents granted by affluent G8 countries or else..!! Many Indian farmers are not aware that innovation by them and their forefathers many soon be stolen and sold back to them after little bit of packaging & shining. If we keep good record of our local varieties & how they are used, and register such



information, it may provide someday in future the basis to challenge such spurious claims. Young scientists and community workers should learn how to record innovations by farmers and artisans.

### **Towards a Different Future**

Another area for investigation should be the production process. Many things practiced by farmers today are not at all based on science, the dealers and merchants pretend to be agricultural experts just as the medicine shop assistant pretends to be a doctor. Majority among us believe that food production will drastically fall if we reduce or stop the use of chemical fertilizers and pesticides. This of course is far from truth, After massive losses from Brown Plant Hopper attack in rice fields and the discovery that frequently sprayed fields suffer higher losses, the Indonesian Government banned overnight 57 common pesticides (and enforced it, unlike in our country where only 15-20 pesticides are declared banned for one purpose and sold for other and no one is prosecuted. Result you can buy any things, anytime, anywhere and whatever you buy is likely to be adulterated) The money saved from subsidy was invested in employing more trained staff and focus was shifted to weed & water management. Within 2 years the yields were more than before with hardly any pesticides application and with lower fertilizer use.

Another case to learn form is that of China. Under state management, Rice farming there had also become chemical intensive, after the 1978 reforms farmers were allowed to choose their crops and management practices. By 1983 many farmers went back to mixed rice-fish farming, and the universities with help from International research organizations & NGOs organized seminars and field trials. In '90s rice-fish farming spread like wild fire, and use of agrochemicals was greatly reduced while the yields of rice as well as fish increased. Figures below illustrate increase in the area of mixed farming where rice and fish are raised together and hardly any pesticides need to be applied.

	<b>1994</b>	<b>1999</b>	<b>2001</b>
Area under Rice – fish	8,53,000Ha	14,64,094 Ha (↑ 71.6 %)	15,28,027 Ha
Production of Fish	2,06,900 ton	6,49,990 ton ( ↑ 214 %)	8,49,055 ton

[Source: Rice Fish Culture in China by Fang Xiuzhen]

Other experiments in many parts of the world and a few places in India has shown that rice yields can dramatically improve by managing filed condition even without synthetic agrochemicals. By transplanting only 1-2 week old seedlings, planting only one seedling per hill and placing them widely apart (25-40 cm), by keeping soil moist but not flooding it, by adding organic matter to soil and deweeding every 12 days : water can be saved, pollution can be reduced yields can be improved. This approach is known today as Sustainable Rice Intensification.

In the Philippines farmers and scientists are testing and developing together new varieties of rice and other seeds under a program called MASIPAG and their varieties often give better return than IRRI promoted HYVs.

Japanese farmers and scientists have developed system of introducing 2 week old ducklings 7 days after transplanting rice at the rate of 100 ducks/ acre and have added Azolla, fish to the rice field. The yield of these farms is at par with chemical harms where





## References

To develop lesson plans on Rice we have looked through the following resources. If you are interested in to see these materials, all resources listed here are available through ENRE resource centre EEL (Environment Education Library). EEL also stores topic related articles from several magazines/news clippings and lesson plans downloaded from web site. Please inquire us.

### Books and Booklets on Rice :

For your convenience we have put some categories.

Category (A) useful for producing materials, (B) useful for teachers & (C) materials for children.

— recommended materials for Environmental Education

P recommended for school library

- The Green Reader (chapter 'Agriculture' p.p 37-58) / Meena Ranghunatan, CEE, 1999/ (A) (B) —
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- Ine no shindan (Japanese) / Noubunkyo, 1998, 141 p.
- Atarashii Seikatsu Class 2 ' Kome wo Tsukurou' (Japanese)/ Tokyo shoseki, 104p.
- Shokunou Kyouiku 1998 (Japanese) / Noubunkyo, 99p.
- Tanbo no Wasuremono (Japanese) / Yutaka Une, Ashi shobou, 1996, 195 p.
- Tanbo no Gakkou- Nyuugaku hen (Japanese) / Yutaka Une , Noubunkyo, 2000, 188p.
- Kodomo Nougyou Gyogyo Taiken Kyoushitsu – Tankentai Techou (Japanese) / Noubunkyou, 33p.



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- ভাতের গল্পকথা / চারুচন্দ্র বন্দ্যোপাধ্যায়, ১৯৪৩, ১৬ পাতা / (A) (B) (C)
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- ধান শুধু ধান / অরুণ মিত্র, অসীম কুমার মুখোপাধ্যায়, ৫৭-বি কলেজ স্ট্রিট, ১৯৮৭, ১৩৪ পাতা / (A)
- ধান উৎপাদন / ডঃ বিশ্বনাথ চট্টোপাধ্যায় ও ডঃ সুনির্মল মাইতি, পশ্চিমবঙ্গ রাজ্য পুস্তক পর্ষদ, ১৯৮৪, ২৮৫ পাতা / (A) (B)
- বিজ্ঞানভিত্তিক ধান চাষ / শ্রী রামানন্দ চক্রবর্তী ও ডঃ বিজন কুমার মণ্ডল, ভারতী বুক স্টল, ২০০২, ১৬৩ পাতা(A)
- দেশিয় ধান সংরক্ষণের উদ্যোগ / চাষের কথা ফ্রোডপত্র - সেপ্টেম্বর ১৯৯৯, ডি.আর.সি.এস.সি / (A) (B)
- কথামূতের বিলীয়মান দৃশ্যাবলী / ডঃ জলধিকুমার সরকার, উদ্বোধন কার্যালয়, ১৯৯৮, ৫৪ পাতা / (A) (B) (C)
- শতবর্ষের আলোয় চুঁচুঁড়া ধান্য গবেষণা খামার (১৯০৪-২০০৪) / Rice Research Station, Chinsurah, ২০০৪ / (A)

## Interesting Websites on RICE

You can find a lot of Web sites on Environmental Education and related activities. The following are the examples of some useful websites on Rice. You can directly access to each web site or contact us for the detail.

### Rice in General – International Year of Rice

The UN has declared the year 2004 as the International Year of Rice. Their Website [www.rice2004.org](http://www.rice2004.org) is providing background information about IYR and is good information source of all related topics about Rice. You can find out useful information and website links on 'About rice, History, Growing, Nutrition, Types of Rice, Around the World, Recipes, Stories, Lesson Plans' as well as 'Kids' pages.

### Lesson Plans

- A lesson plan and activity for elementary schools can be found at [www.graindell.com/kids.htm](http://www.graindell.com/kids.htm)
- You can find our interesting lesson plans for upper primary to middle school at [www.askasia.org](http://www.askasia.org) such as 'Rice : The Global Crop' 'The Rice Plant' 'Asian Staple Foods' 'How much is there to eat' so on. Other interesting sites are [www.carrice.org](http://www.carrice.org), [www.curriculumsupport.edu.au](http://www.curriculumsupport.edu.au)

### Growing Rice

You can see the example of growing rice in bucket at [www.kidsgarden.org](http://www.kidsgarden.org). To learn about how rice grows by looking at the diagrams of the inside of a rice plant at [www.dft.moc.go.th](http://www.dft.moc.go.th), & 'Rice cycle page' at site [www.brucebriscoe.com](http://www.brucebriscoe.com) provides the 3 month life-cycle of rice by looking at the picture of growth in Bali.

### Types of Rice

At [www.riceinfo.com](http://www.riceinfo.com) you can recognize the different types of rice by photos. To find out the difference kinds and forms rice, you can see at [www.ricemilling.com](http://www.ricemilling.com).

### Nutrition

Find out nutrition benefits of rice and why people eat rice at [www.sunrice.com.au](http://www.sunrice.com.au), [www.riceromp.com](http://www.riceromp.com), [www.gordonhanrahan.com](http://www.gordonhanrahan.com).

### Rice India

"Gobar Times — Rice issue (January 2004) invited the readers to send 'Rice Reporter Entries' reflecting International Year of Rice 2004. In the recent issue they expressed their pleasure having received so many entries and reports from all over India. You can read these reports on their websites [www.gobartimes.org](http://www.gobartimes.org). The report sent by ENRE is also included in it.



Gobar Times May 15, 2004



## Books and References on Environmental Education & creative lesson plans (Concept, Ideas & Theory) :

- Chapter / Book "What is Environmental Education' ("Environmental Education in Schools") / Judy A. Braus / 1993, Peace Corps / p.p.5-14 (A) (B)
- Booklet "The Green Reader – An introduction to Environmental concern and Issues" / Meena Raghunathan / 1999, CEE / 204p/ (A) (B) \_
- Booklet "Environmental Orientation to school Education : A Programme of Ministry of Human Resource Development – Some experience and learning"/Meena Raghunathan / 1999, CEE / 92p/ (A)
- Handbook "Green Minds : A Reference Handbook for Environment Educators in Kalimpong" / Yusuf Simick / Ashok Trust or Research in Ecology and the Environment (ATREE) (A) (B) \_
- Book "Environmental Education An Approach to Sustainable Development " OECD/ 1992 (A)
- Guidebook "Idea's Environment Action Program , Issues, Approach, and Initiatives towards Sustainability " CEE 1995 (A) (B)
- Guidebook "The Green Club : A Guide to Setting Up and Running Clubs for the Environment" / CEE 1999 / 78p (A) (B) \_
- Guidebook "The Green Action guide : A Manual for Planning and Managing Environmental Improvement Projects " CEE, 1997 / 92p. (A) (B) \_
- Report "Environment & Development : Traditions, Concerns and Efforts in India" (National Report to UNCED, June 1992 / Ministry of Environment and Forest – govt of India / 63p. (A)
- Handbook "Ecology : Principles and Applications " J.L. chapman et al, 2000, Cambridge University / 330p. (A)
- Handbook "Earth Education : a New Beginning " Steve Van Math, 1999 / 334p. (A)
- Curriculum guide "Connections, Cycles and Cities ("Living Lightly on the Planet – volume 1, Grades 7-9 – Unit 4 " Haura O'cinnor, 1985, Schilits Audubon Center / p 76-98 (A) (B)
- Book 'Curriculum Planning' ("A Children's Food Forest" Carolyn Nuttall, 1996, FeFI Books / p 53-72 (A) (B) \_
- Booklet "Toward a Green Future : A Trainer's Manual on Education for Sustainable Development " CEE, 1999 / 111p. (A) (B) \_
- Book "The FoxFire Book" / Eliot Wigginton & his students / Anchor Books / 1969 / 384p. (A) (B) (C) \_ P
- Internet paper "Classroom as Learning Laboratories" & "Core Practices" / foxfire.org / 3p.
- Book "Science is ..." / Susan V. Bosak / Scholastic, 1991 / 515p. (A) (B) \_
- Magazine "Green Teacher - Education for Planet Earth" (Tim, Grant & Gailcittlejohn, (ed), Green Teacher, Canada, www.greenteacher.com)

## ENRE Partner Organisations' Contact Address

- **Swanirvar**  
(contact person : Mr. Samir Biswas)  
Andharmanik, Baduria,  
North 24 Parganas - 743401  
West Bengal
- **Ashuruli Gram Unnayan Parishad**  
(contact person : Mr. Alok Maji)  
Asuruli, Sadhur hat,  
South 24 Parganas - 743504  
West Bengal
- **Kajla Janakalyan Samity**  
(contact person : Mr. Vivekananda Sahu)  
Sarada, Contai  
Midnapur - 721427  
West Bengal
- **Champa Mahila Society**  
(contact person : Mr. Amal Nayek)  
Vill & P.O. Shibganj  
P.S. Basanti  
24 Parganas (S) - 743312  
West Bengal
- **Phulbari Grameen Bikash Kendra**  
(contact person : Mr. Torun Kanti Bera)  
Phulbari, Sagarphulbari,  
Rudranagar, Sagardeep,  
South 24 Parganas  
West Bengal
- **Vikramshila Education Resource Centre**  
(contact person : Mr. Atanu Sain)  
77 Maharaja Tagore Road  
Dhakuria, Kolkata - 700031  
West Bengal
- **Sundarika Bartika**  
(contact person : Mr. Arunava Biswas)  
P.O. Sarisha (Bosepukur Parh)  
Dist. South 24 Parganas  
Pin - 743368, West Bengal



### From ENRE

- Please send us the 'feedback slip' (p. 97) alongwith your comment & suggestion on this booklet. We will put your name on our mailing list and send you a free copy of the next booklet.
- Forthcoming issues of 'Creative lesson plan - Basbhumii series' are Special issue **Booklet 0** on 'Active Learning Methods & Tools' (only in Bengali), followed by topic wise booklets 7) Waste, 8) Fish, 9) Energy (Fuel), 10) Vegetables, 11) Local market, 12) Community development work/NGO work.
- You can see more information on ENRE project and the summary content of each published Basbhumii booklet (ENRE Topic Page) through our organisation website [www.drcsc.org](http://www.drcsc.org)



## Feedback Slip

Rice

If you would like to be included on 'Basbhum Series' mailing list and receive forthcoming Creative Lesson Plans booklet then please fill up this slip and return it, in the envelope address to :

**'Basbhum Booklet'**  
**ENRE Project, DRCSC**  
58A, Dharmatola Road, Bosepukur  
Kasba, Calcutta-700 042  
West Bengal, India

[OR you can send the  
same content by email  
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Thank you for your cooperation.

- Your name or contact person of your organisation

Name: \_\_\_\_\_  (Mr.)  (Ms.)

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- You are going to use this Creative Lesson Plan booklet

as a  teacher  educator  community workers  
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because \_\_\_\_\_  
\_\_\_\_\_

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- Among the topics of forthcoming booklets which topic are you interested in ?  
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1. Tree     2. Insect     3. Water     4. Medicinal plants     5. Bird  
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 11. Local Economy     12. Community Development

- Your contribution, if possible

- Exchange EE materials / booklet  
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- Your comments / suggestions

- Do you want to place order 'Bashbhumii Series no. 6 - Creative Lesson plans on Rice ?  
(10% discount offered for more than 10 copies ordered, booklet no. 1 - 5 also available,  
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Yes                      \_\_\_\_\_ Copies                       No

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