ORGANIC & INORGANIC RICE PRODUCTION
A CASE STUDY IN YASOTHON PROVINCE, NORTHEAST THAILAND

by Walaiporn Od-ompanich, Areerat Kittisiri and Manitchara Thongnoi
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This case study consists of three parts:
1. A detailed examination of rice cultivation techniques in northeast Thailand.
2. A detailed study of rice cultivation innovations by the farmers in the case study.
3. A detailed study of organic rice marketing carried out by a villagers’ group in the area of the case study.

Organic and Inorganic Rice Production

This study on organic and inorganic rice production was conducted in two villages, Sokkumpoon Village and Kudhin Village, Kudchum District, Yasothon Province, northeast Thailand. The study was carried out with ten organic farmers and ten inorganic farmers and aimed to document the cultivation technologies they used, as well as allowing the farmers to develop innovative technologies. The documentation is focused on the whole process of rice cultivation, but farmers focused their testing of innovations on two important activities, namely (a) soil improvement and (b) seed selection and conservation.

An explanation of the basic principles of organic farming is given, followed by a detailed report of the concrete techniques used in the 22 stages of organic rice cultivation.

Rice Cultivation Innovations Tested by Farmers

The farmers involved in the study on organic and inorganic rice production focused their attention on two important innovation activities, namely (a) soil improvement and (b) seed selection and conservation. Detailed information on the preparation and use of animal manure, fermented bio-liquid, and green manure is given.

Despite the loss of many traditional varieties of rice over the last 50 years, the farmers in the area of the study in Yasothon Province still use 17 varieties regularly. Details of these 17 varieties are given. Local farmers’ methods of stock seed
production, selection, and preparation are described.

A method of cutting paddy plant leaves about two months after broadcasting was also tested by two farmers and found to give good results in increasing yield and minimizing weeds and pests.

Organic Rice Marketing

The history and background to the founding of the Nature Care Club in Kudchum District and the construction of the two organic rice mills there is briefly described.

Prior to the transition to sustainable agriculture and organic rice cultivation, although agricultural chemicals such as insecticides and herbicides were little used, the farmers in the study area did use chemical fertilizers. When selling their rice they were also at the mercy of the middlemen or rice mill owners and had little bargaining power over the price of their produce. This situation resulted in widespread indebtedness in large areas of rural Thailand. The way out of this problem for the farmers of Kudchum District was to switch to organic rice cultivation, and construct and operate their own organic rice mills.

The construction of the first mill in 1991 was through local fund mobilization and through advance orders for organic rice from NGOs and consumers in the local area and Bangkok. A second, and much larger mill, was constructed in 1999. The mill is managed by an elected management committee and is operated along strictly fair trade lines. All member rice farmers deposit their rice, whether organic or inorganic, at the mill and receive a price substantially higher than the current market price. In addition, the mill also acts as a banker, and pays members dividends on the profits made from operation of the mill each year.

One of the achievements of the Nature Care Club and the mills has been the export of their organic rice to Europe. The club is one of only two organic rice producer groups in Thailand to do this. Green Net, a Bangkok-based NGO, has played an important role in this initiative, both in finding European contacts for marketing the rice and arranging for organic accreditation for the mill and farmers group.

Problems exist, however. The mill now accepts more rice than it can sell and suffers from a problem of surplus paddy stocks. Thai consumers also remain overwhelmingly indifferent to organic produce. Consumer education and consumer-producer links are thought to be the long-term solution to these problems.
This study on organic and inorganic rice production was conducted in two villages, Sokkumpoon Village and Kudhin Village, Kudchum District, Yasothon Province, northeast Thailand. The study was carried out with ten organic farmers and ten inorganic farmers. Selection of the farmers was made through consultation with the members of the Nature Care Club, which is located at the organic rice mill in Kudchum District. The project objectives were explained to the selected farmers, whose farming practices were then surveyed. After collecting data for three months, it was found that two inorganic farmers had decided not to apply chemical fertilisers. The study team thus decided to collect data on chemical use based on the previous year (2003/04). The reason stated for not using chemical fertilisers was a long drought and the presence in the field of sufficient organic matter.

The study aimed to document the technologies used by the farmers, and allowed farmers to develop innovative technologies appropriate to their condition. Although the documentation is focused on the whole process of rice cultivation, farmers focused their experiments on two important activities, namely (a) soil improvement and (b) seed selection and conservation.

1. General Characteristics of the Case Studies

For organic rice growers, the average landholding was 28 rai (4.5 ha) and 22 rai (3.5 ha) for inorganic rice growers. All farmers had land certificates. One organic rice grower had just bought new land from his neighbour. He observed that farmers wanted to sell land because there was only work for elderly people on the farm; the youth had all migrated to the cities for work. The average labour force on farms is two to three persons, most of whom are over 45 years old. Farmers stated that the problem of labour shortage was serious during transplanting and harvesting. Hired labour is scarce and expensive.

In terms of rice cultivation, for the inorganic rice group, only three still practised transplanting while the rest had shifted to broadcasting, which takes less time. For the organic rice group, four families practised transplanting, three families practised broadcasting, and three families practised both. Farmers practised transplanting with local varieties.

It was found that organic rice growers used more diversified varieties of rice compared to the inorganic rice growers. They used both HYVs (RD 6 - rice department variety) and native varieties (Jasmine and other native varieties, such as Jao Loy, Sanpatong, Lao Tak, and Nangnuan). Farmers still kept native varieties because they can be used to make desserts or local noodles. Two inorganic rice growers kept native varieties such as Jao Daeng and Upland Phupan. One farmer explained that Jao Daeng is believed to give a good yield when grown with other varieties. It can also be used to make fermented rice noodles and local desserts.

There are four main sources of seed. Most farmers developed and selected their own seed, and they also exchanged seed with the Nature Care Club or with neighbours. All organic rice growers changed the seed they used every three years, as suggested by the Nature Care Club. Inorganic rice growers changed rice seed every three to four years, depending on the seed quality. One inorganic farmer exchanged rice seed with the Nature Care Club and one obtained seed from the district government office.
### Table 1 General Characteristics of the Case Studies

<table>
<thead>
<tr>
<th>General Characteristics</th>
<th>Organic rice growers</th>
<th>Inorganic rice growers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average land area</td>
<td>4.5 ha. (1.6-11.2 ha)</td>
<td>3.5 ha. (2.8-6 ha)</td>
</tr>
<tr>
<td>Land ownership type</td>
<td>Land certificate</td>
<td>Land certificate</td>
</tr>
<tr>
<td>Soil type</td>
<td>Sandy soil containing organic matter</td>
<td>Sandy soil containing organic matter</td>
</tr>
<tr>
<td>Number of family members</td>
<td>3-4</td>
<td>3-5</td>
</tr>
<tr>
<td>Household farm labour force</td>
<td>2-3</td>
<td>2-3</td>
</tr>
<tr>
<td>Rice varieties used</td>
<td>RD 6, Jasmine 105, Red Jasmine, Jao Loy, Sanpatong, Lao Tak, Nangnuan</td>
<td>RD 6, Jasmine 105, Phupan, Upland rice, Kao Kam (red glutinous rice)</td>
</tr>
<tr>
<td>Source of seed</td>
<td>Owner developed, Nature Care Club, exchange with neighbours</td>
<td>Owner developed, Nature Care Club, exchange with neighbours, district government office</td>
</tr>
<tr>
<td>Machinery used</td>
<td>Tractor, water pump, threshing machine</td>
<td>Tractor, water pump, threshing machine</td>
</tr>
<tr>
<td>Fertilisers</td>
<td>Compost, green manure, fermented bio-liquid, chicken manure</td>
<td>Compost and chemical fertiliser (Formula: 16-16-8)</td>
</tr>
<tr>
<td>Use of pesticides and herbicides</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Cows and buffalos raised</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Source of water</td>
<td>Rainfall, fish pond</td>
<td>Rainfall, fish pond</td>
</tr>
</tbody>
</table>

1.2 Application of Farm Inputs

In both Kudhin and Sokkumpoon Villages, there was no report of the use of pesticides or herbicides. In fact, very few farmers in northeast Thailand apply pesticides or herbicides in rice fields. However, farmers still applied chemical fertiliser. Among the inorganic rice growers, chemical fertilisers were applied at different volumes. Of the ten farmers, two farmers decided not to apply chemical fertiliser. This was because a long drought had hit the area and the farmers were reluctant to invest more money in their fields. In addition, they observed that there was not much difference between applying chemical fertiliser and organic fertiliser, so they decided to apply compost and animal manure, such as chicken manure. All inorganic farmers used formula 16-16-8 fertiliser. The price of the chemical fertiliser is 490 Baht ($12.25) per sack (50 kg.). It was observed that the inorganic rice growers tended to use less chemical fertiliser than Thai farmers who operate a fully modernized farming system, and when used, both chemical fertiliser and organic fertiliser were applied. Normally, farmers applied chemical fertiliser to their seeding bed and during the pregnancy stage (the period just before the rice grains appear).

During land preparation, farmers applied compost mixed into the soil. None of the inorganic farmers practiced cultivation of green manure. For the organic rice growers group, farmers practiced different methods. Compost was the most common method used by both inorganic and organic farmers. In addition, all organic rice growers grew legumes such as sword bean or mung bean, and collected the seed before ploughing the plants into the soil.

During the pregnancy stage, farmers sprayed diluted fermented bio-liquid (also known as “fermented plant juice”, see 2.2. below) on the fields, while inorganic farmers applied chemical fertiliser.

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2 All dollar values are US$ calculated at an exchange rate of 40 Baht/US$. 

1.3 Organic Rice Cultivation in Kudchum

The majority of Thai people are engaged in farming. Agriculture is practised over large areas of the country, and the greatest part of that area is used for rice cultivation for both domestic consumption and export. Rice has been one of the commodities that has brought fame to the country since the 19th century and this has continued right up to the present. Development of rice cultivation in Thailand has been made possible through the extension of modern rice culture using machinery and modern production technologies, as well as inputs such as chemical fertilisers, pesticides, herbicides, and so on.

Past lessons show that the more farmers farm the more dependent they become on external inputs, and the poorer they become. However, in the past two decades, more leaders and groups have been searching for alternative farming practices that help them reduce their dependence on outside inputs. They also initiate patterns and techniques which enhance conservation of the environment, are friendly to nature and safe for the health of both producers and consumers. Consequently, the ideal concept of an organic rice culture is one that is safe for the environment and promotes reciprocity between nature and the health of the producers. It should be able to provide and develop means of production and inputs that are produced by the farmers themselves. These techniques must be initiated, tested and experimented with until they become established practical knowledge. This trend is exemplified by the case of farmers at Sokkumpoon and Kudhin Villages in Kudchum District, Yasothon Province.

1.4 What is Organic Rice Cultivation?

Firstly, we should try to define what we mean by “organic rice cultivation”. The following five sections (1.4.1 to 1.4.5) are an attempt to do this. It will be clear from the definitions that changing from inorganic rice cultivation to organic rice cultivation involves changes in lifestyle and attitudes towards the natural surroundings, not simply changes in the kinds of fertilisers used in the cultivation process.

1.4.1 An organic production system is:
- a production system giving priority to building a solid food foundation and security for families, and not solely a market-oriented production process to earn income to buy food;
- a production system that promotes mutuality with the environment, society, and way of life, and enhances the spirituality of the producers;
- a production system relying on indigenous knowledge and local wisdom that is appropriately adjusted by local communities;
- and a system that can clarify linkages of the production system with social change.

1.4.2 Basic qualifications of those engaged in organic rice culture are:
- their families are in agreement with this engagement and hold to similar concepts, namely a need for self-reliance;
- they like to learn, are brave to experiment, and have self-confidence in the direction of organic farming;
they accept the concept of group process and are open to the ideas of others.

they are moral and hold religious values;

they actively build a system of self-reliance as a foundation for the family, such as preparation of bio-fertiliser and compost, and raise animals for labour and food;

they grow on their farmland diversified crops such as vegetables, fruit trees and herbal plants for domestic consumption, and exchange and sale when there is a surplus;

they are able to explain the linkage between what they are doing with policy-oriented advocacy.

1.4.3 Initial principles on organic rice production are:

• plan land levelling and partitioning of rice fields. Rice field dykes should be 2-3 metres wide and 1 metre high. The rice field is for growing rice and soil enriching plants. Fruit and other perennial trees and herbal plants are grown on the dykes. At present, some farms build chicken and duck houses on dykes, and grow both wild and commercial grass varieties for cows;

• plan management for appropriate land use through soil improvement and maintenance of soil richness without burning rice stalks, but using cow dung, compost and green manure, especially legumes;

• produce some farm inputs for own use, such as seeds of legumes and other soil enriching plants, organic rice seeds, compost, cow dung, fermented bio-liquid fertiliser, and so on;

• plan production to stimulate market as well as processing some produce for family consumption.

1.4.4 Outputs of organic rice production are:

• the environment is improved, and the soil is loosened;

• there is greater biodiversity in both plants and animals;

• human beings have improved physical and mental health since there is sufficient healthy food for household consumption. Neighbours also realise the value of this and wish to follow the pattern;

• inputs produced on the farm to substitute for chemical inputs serve as an essential source of courage helping farmers to gain confidence in organic farming as a viable method of alternative farming;

• by-products of organic rice cultivation help families to earn additional income, leading to some saving. Children of some families realise the value of this practice and want to carry on this heritage;

• farmers regularly learn new knowledge and techniques, such as local propagation of rice varieties, system for rice intensification, and related policies, such as the problems of genetically modified organisms (GMOs), farm chemicals, and so on.

1.4.5 Essential conditions for organic rice cultivation are:

• there should be a revolving fund for development of infrastructure for production, such as pond and artesian well digging, land levelling, and so on;

• there should be organisation of farmers for exchanges of experience and finding solutions to production problems;

• farmers should identify directions for self-reliance by making production inputs;

• cultivable area for organic rice culture should start from 5 rai (0.8 ha);

• there should be organisation of farmers to manage production and value addition;

• linkage among farmer groups is needed so that farmers can share and learn from each other.

A rice field soon after transplanting
1.5 The 22 Stages of Organic Rice Cultivation

1.5.1 FIRST PLOUGH

**Objectives**
- To prepare the soil before rice cultivation.
- To turn over the soil to dry and eliminate weeds, such as grass.
- To prepare the soil for cultivation of green manure and apply cow dung to the rice field.
- To till the land to cover remaining rice stalks.

**Techniques/Methods**
- Start at the beginning of the rainy season with soil humidity around 50% or humidity to the depth of around 8 inches (20 cm).
- Apply cow dung or chicken droppings thoroughly and evenly around the field before tilling.
- If the farmer wishes to grow green manure plants, the seed should be spread after applying organic fertiliser, which should be carried out in April or May.
- If the farmer wishes to grow green manure plants to collect the seeds, or grow crops after the rice harvest, or till the land to cover rice straw to fertilise the soil, this should be done in November and December. Harvesting of seeds is carried out in April and the farmer can then till the land to cover legume remains.

**Costs**
- Cost of power tiller at 150 Baht ($3.75) per rai, 5 rai per day.
- If power tiller is self-driven, add 13 Baht ($0.32) per rai for gasoline.
- If a buffalo is used, a farmer can till half a rai per day (morning and afternoon) for the cost of a bag of grass.

- If a farmer wants to till and level the land for cultivation, the cost of labour is 170-180 Baht ($4.25-4.50) per rai depending on the condition of the soil.

1.5.2 CULTIVATION OF GREEN MANURE PLANTS

**Objectives**
- To provide green fertiliser for soil improvement and add soil nutrients (grown in April), and to collect seeds (grown in November).
- To mulch the soil to maintain humidity.
- Popular plants include mung bean, sword bean, *Sesbania Rostrata*, pigeon pea, red bean, groundnut, or perennial trees like neem, rain tree and Indian laburnum.

**Cost**
- The cost of sword bean seed is 15-20 Baht ($0.37-0.50) per kilogram, using 8 kg per rai.
- Mung bean seed is 20-25 Baht ($0.50-0.62) per kg, using 5 kg per rai.
- African Sesbania seed is 30-35 Baht ($0.75-0.87) per kg, using 5 kg per rai.

1.5.3 FIRST PLOUGH AND LEVELLING PLOUGH

**Objective**
- To till the soil to cover organic fertiliser and eliminate weeds again.
- To loosen and crush the soil.
- To level the land for easy cultivation and other activities.

**Technique/Method**
- Overturn the soil to cover weeds. The soil to be tilled must be humid without actually being wet.
- When levelling, the farmer must till from higher to lower land.
- Where grass is abundant, the plough must be pushed hard to break weed clumps so that they will die faster.

Cost
- Cost of tilling labour is about 180 Baht ($4.50) per rai.
- Around 4 rai can be tilled per day.

1.5.4 PREPARATION OF RICE SEED

Objectives
- To prepare good rice varieties with a high rate of germination.

Technique/Method
- Screen out lean rice seed.
- Soak the seed for one night and dry for one more night by covering with jute sacks or placing in a basket.
- Sow on farmland with water level no higher than 5 centimetres.
- For dry sowing, soaking is not necessary.
- To prevent seed being eaten by insects and worms, the seeds are soaked in water containing the extract from crushed *bouraphet* (*Tinospora Crispa* (L.), a bitter herbal vine) stems. This method is called rice vaccination.
- Seedlings can be harvested when they are 25-30 days old.
- About 10 kg of seed are required for one rai of land.

Cost
- Cost of seed sold at the Nature Care Club is 12 Baht ($0.30) per kg, and at the rice experimentation station is 15 Baht ($0.37) per kg.

1.5.5 PREPARATION OF THE SEEDLING PLOT

Objective
- To prepare seedlings to be transplanted in the rice field.

Technique/Method
- Spread organic fertiliser on the field plot to be used as the seedling nursery, and break up the soil.
- When levelling the soil, use a wooden blade with a handle to smoothen the soil. If the soil is not smooth, the growing seeds will stick together.
- When levelling the soil, the water level should not exceed five centimetres.
- Sow the plot evenly with seed soaked overnight.
- After the first night, drain out the water so that the seed will not rot.
- Farmers sometimes sow the seed without water. This is called dry sowing. This method requires more care, as highly smoothened soil and complete absence of weeds is necessary. When the seeds start to grow, water can be drawn into the field.
- Normally, farmers will select a plot for seedlings from the most fertile land with good drainage, and with no shade. The plot should not consist of muddy clay as that would make it difficult to uproot the seedlings.
- On clay soil, mix rice husk or bran into the bed floor for easier uprooting of seedlings.
- Do not apply pig or duck dung to seedling plots. This will result in excess growth of seedling roots, making seedlings difficult to uproot.
- A seedling plot requires about 25-35 kg of seed for transplanting onto 10-15 rai of land.
- When seedlings start to grow, they feed themselves from the seed. When they develop four young leaves, they begin to feed on nutrients from the soil. Thus, if the seedling
is younger than 30 days, the farmer should not apply fertiliser because this will cause the seedlings to grow taller with fewer roots. Such seedlings will be weak and unsuitable for transplanting.

**Cost**
- Cost of tilling the seedling nursery plot is 180 Baht ($4.50) per rai.

### 1.5.6 CARE OF THE SEEDLING PLOT

**Techniques/Method**
- Prepare a trench around seedling beds to drain excess water, especially during the shooting stage.
- If it rains, water must be drained to prevent seedlings sticking together.
- When the seedlings are ten days old, water should be allowed into the plot to a level of about five cm.
- If the seedlings do not grow well, apply animal dung. Cow, buffalo and pig dung will make it difficult to uproot the seedlings.

### 1.5.7 UPROOTING SEEDLINGS

**Objective**
- To prepare seedlings for transplanting to the rice field.

**Technique/Method**
- Do not leave uprooted seedlings exposed for more than one day as this will cause the roots to grow and coil, making transplanting difficult.
- When uprooting seedlings, pile them up allowing the roots to dip in water. This is called 'dipping seedlings', and will make the roots strong without drying them up before transplanting.
- Trim seedling top to allow faster shooting.

**Cost**
- Cost of seedling uprooting is 1.20 Baht per bunch. 2-3 handfuls of seedlings make one bunch.

### 1.5.8 TRANSPLANTING

**Technique/Method**
- Before transplanting, water should be allowed into the rice field and remain there for one week to allow the soil to be loosened and to eliminate weeds. Before transplanting, drain the water out until it is at about knee level when standing upright in the rice field mud.
- Transplant seedlings no deeper than three cm. If seedlings are transplanted too deeply, seedling growth will be slow. If transplantation is too shallow, they will float if there is water in the rice field.
- Appropriate distance between clumps is 25-30 cm.
- Transplant 1 to 2 seedlings upright to stimulate faster shooting and to make for easier weeding.

**Cost**
- Wage for transplanting is 100-140 Baht ($2.50-3.50) per day. Each worker can transplant about half a rai per day working from 07.00 – 17.00.

### 1.5.9 DIRECT SOWING

**Technique/Method**
- Relevant for families with less labour.
- The rice field should have access to water resources and preferably have good drainage characteristics.
- Relevant for areas with fast flooding (riparian areas) and areas with newly developed infrastructure.
- Besides organic fertiliser, green manure plants may also be sown together with the rice seed to add soil nutrients. Rainfall will cause the legumes to grow ahead of the rice and these should be flooded within seven days, when water is retained in the field.
- Requires 15 kg of rice seed, and 5-7 kg of mung bean or sword bean per rai.
**Remarks**
- If farm management, especially concerning water, is poor, more weeds will appear, resulting in difficulty of harvesting and a low yield. If water management is good, the yield will be higher than for the transplanting system.
- Two farmers tested the technique of cutting paddy plant leaves two months after seed broadcasting (see 2.4 below).

**Cost**
- 5-7 kg of seeds used at 12-15 Baht per kg.
- Wage for tilling is 170-190 Baht ($4.25-4.75) per rai.

### 1.5.10 WATER MANAGEMENT

**Objectives**
- To foster even growth of rice plants
- To ensure sufficient water supply for the needs of the rice plants.
- If water management is good, contamination from chemicals used in adjacent fields can be controlled.
- To control weeds and other pests, such as crabs.

**Technique/Method**
- Water level in the rice field is appropriate when rice plants of about 15-20 cm in height stand upright. If the water level is higher than this, there will be no new shoots, but the rice plants will grow taller.
- If the water level is lower than this, the rice plants will not grow and there will be more weeds.
- When there is a shortage of rainfall, farmers have to draw water into the rice field at least once a week.
- Field dykes should be constructed to be at least one metre higher and wider than usual to prevent water overflowing from adjacent fields.
- Growing fruit trees on the dykes will prevent the dykes from collapsing and chemicals from being blown in by the wind.
- There should be a system for storing water for rice fields, such as ponds and artesian wells, especially on high land.

### 1.5.11 WEED CONTROL

**Objectives**
- To prevent weeds in rice field from taking nutrients from rice plants.
- To foster convenient and easy harvesting and to prevent weeds from mixing with the harvested rice.

**Technique/Method**
- For weeds growing in the rice field, simply uproot them and use them to prepare compost.
- Allowing ducks into the rice field will help eliminate weeds. However, ducks should be allowed into the field only when rice plants have grown to about 15-20 cm in height.
- Some weeds, such as the local vegetables Waen and Gayaeng, can be used as food.

### 1.5.12 PEST CONTROL

**Objective**
- To prevent pests from destroying rice plants and lowering yield.

**Technique/Method**
- Crabs may eat young rice plants.
  - Use a jar or fish traps to catch crabs for human food or feed for animals, such as pigs.
  - Grind the stem of the bitter vine *bauraphet* and *Prong* (*Acrostichum speciosum*, mangrove fern, a palm-like plant) rhizome together and soak in water. Filter and spread the water on the area where the crabs live. The crabs will leave the area.
  - Use steamed rice to feed crabs. The steamed rice will give the crabs stomach problems, causing them to die.
  - Spread chicken droppings in the rice field. The crabs will leave as they cannot stand the smell of chicken droppings.
- Some suggest that farmers sow sword bean seeds on the area where crabs eat the rice plants. When the sword bean seeds rot, they will give off a bad smell that will drive the crabs away.

**Thrips**
- Spread cow dung where thrips attack, which should stop the attack.
- Grow trees on field dykes to provide a habitat for red ants, which will drive away the thrips.
- Drawing water into the rice field is very effective against thrips, which usually occur in dry weather.

**Golden Snails (These snails devour the base of young seedlings)**
- Collect golden snails manually. (They can be eaten.)
- Finely chop the golden snail to prepare bio-fertiliser.
- Sow rice grains in the rice field. The golden snails will die of stomach problems when eating the rice.

**Rodents**
- Catch rodents (they can be eaten) by using traps, nets and so on.
- Make use of natural predators of rodents, such as snakes, owls, and mongeese.
- Regularly inspect field dykes. If rodent holes are found, fill the holes in immediately.

### 1.5.13 CARE AND MANAGEMENT OF DYKES

**Objectives**
- To clearly separate organic and chemical farming rice fields.
- To prevent chemical contamination of the rice field from outside.
- For easy water management.
- To provide an area for fruit trees and vegetable cultivation.
- To provide an area for grass cultivation for animals.
- For easy transfer of produce from, and various inputs into, the rice field.

**Technique/Method**
- Expand the dykes to 2-4 meters wide and 1-2 meters high. In areas where there are floods, dykes should be further enlarged.
- Grow grass on the dykes to prevent soil erosion and provide animal feed; grow fruit trees on field dykes.
- Use water management systems, such as installing drainage tubes and building up (adding height and width to) the dykes.
- The dykes must be regularly maintained since fruit trees and grass grown on the dykes could provide a habitat for rodents and other dangerous animals, such as vipers.

### 1.5.14 ORGANIC FERTILISER APPLICATION

**Objectives**
- To improve the soil, accelerate the growth of rice plants.
- To increase yield.
- To increase soil nutrients without using chemicals.
- To motivate the use of waste/organic matter from farmland.

**Technique/Method**
- Apply before tilling. If the intention is to accelerate growth, apply 45 days after transplanting.
- Do not use chicken droppings from chicken pens, especially those from lower layers, as they are too “hot” (the ammonia content is too high) and can cause “fertilizer burn”.
- Use a variety of organic fertilisers. Do not use any single fertiliser, such as only chicken droppings, as that will raise costs. Using whatever organic fertilisers are cheap and easily available will help keep costs down. Preferably, prepare a mixture of fresh husks, cow dung mixed with fermented bio-liquid (see 2.2) and chicken droppings, and leave to ferment before spreading.
Before using bio-fertiliser, spread fermented bio-liquid on it first to prevent pieces of cow dung, chicken droppings, and so on being blown away.

Despite the above, there is no ready-made formula for application of bio-fertiliser. It is up to the farmer to observe and analyse effectiveness for him/herself.

If bio-fertiliser, especially chicken droppings, is overused, rice plants will develop too many leaves but no ears.

Do not spread chicken droppings while rice leaves are wet with rain or mildew as it could burn the leaves.

1.5.15 SELECTION OF RICE VARIETIES

Objectives
- To obtain suitable uncrossed rice varieties free of mutations.
- To obtain rice varieties having a high rate of germination.

Technique/Method
- Select an appropriate area to grow stock plants. This should be in the middle of a plot of the variety planned for selection.
- The area should not be too high or too low and should have good water management.
- Regularly inspect the plot to prevent damage by pests, and keep the plot weed-free.
- Regularly uproot abnormal rice plants, such as those with early development of ears, disease infection, abnormal shooting, irregular height, and so on.
- Harvest stock plants separately from other rice when leaves are brown.
- Tie the grain together and dry for a few days. Collect them in the morning.
- Select ears before threshing.
- Store in sack separate from other grains, and label the sack appropriately.
- The grain should have a humidity of not more than 13%.

Information
- Rice is largely self-pollinating.
- Rice flowers from about 8 am to 4 pm. Most flower at midday.
- Rice flowers for only 4-5 days. If pollination does not take place during that time, the plant will not develop ears.

1.5.16 HARVESTING

Technique/Method
- Harvest should be carried out when the grain is yellow or light brown, about 27-30 days after flowering (the day when 80% of the rice flowers is called the day of rice flowering).
- Harvest when there is no moisture and no rain. This will result in a low rate of broken rice.
- Dry under the sun for a few days in sheaves.
- If there is water in the rice field, drain the water out 10-15 days before harvesting to speed up the ripening process of the grain. This will make it more convenient for harvesting.
- Collect rice ears only in the morning and evening, to prevent grain from falling out.
Cost
- Wages for the harvest is 1 to 1.20 Baht ($0.50) per sheaf (5 handfuls is 1 sheaf).
- Wage for making sheaves is 30 Baht ($0.75) for 100 sheaves (the owner provides the binding materials).
- 300-400 sheaves can be harvested per rai.
- One worker can harvest about 150 sheaves per day.

1.5.17 THRESHING

Technique/Method
- When threshing by hand, a ritual of apology should be offered to the rice before threshing by offering a bottle of rice wine and an egg.
- For machine threshing, the machine should be thoroughly cleaned before threshing organic rice. At least the first three sacks of rice threshed must not be sold, but kept for domestic consumption or chicken feed.
- Sacks for organic rice can be obtained from the Nature Care Club rice mill. Name, address, membership code, number of sacks and date of packing should be clearly written before submitting rice to the mill.

1.5.18 DRYING

Objective
- To reduce moisture content of rice grain.

Technique/Method
- The cost of organic rice threshing is 5 Baht per sack (30-40 kg).
- Hand threshing is 300 Baht for 1,000 sheaves. This gives around 800-1,000 kg of unpolished rice.
- Machine threshing will require reciprocal labour. It is customary to provide food and drink for the labourers.

1.5.19 YIELD MANAGEMENT

Objective
- To store the harvested rice before marketing.

Technique/Method
- Pack in sacks provided only by the Nature Care Club rice mill.
- Do not store chemicals in the rice barn.
- Farmers must record the organic rice yield (total harvest in kg ÷ no. of rai).
- The members must bring harvested rice to the rice mill for storage by January each year. After that, the rice will not be considered organic rice.
- The floor of the group rice storage granary is covered with a 2.5 cm thick layer of husks. Rice sacks will be placed in neat rows as they come in.
1.5.20 SALE OF RICE

**Technique/Method**

- The produce is sold at a price agreed to between the members and the Nature Care Club rice mill. This price is fixed every year. In recent years the price of organic rice is 10,000 Baht ($250) per ton.

- Farmers depositing rice during the first phase (before the end of December) will receive payment by January 31, and during the second phase (January or later) will receive payment by March 31 each year.

- The sale of rice grain requires a purchase order to be issued by the Nature Care Club rice mill. The members must receive this document every time they sell rice to the mill, and must keep the document as evidence of sale.

1.5.21 PREPARATION OF COMPOST ON FARMLAND

**Objectives**

- To enrich the soil.
- To reduce the burden on delivery, transportation and costs of cow dung from other locations.
- To make compost easy to acquire, and relevant for farm management, i.e. by using materials such as weed waste and rice straw.

**Technique/Method**

- Select a relatively high area with no flooding. The location should be shady and near a water source.
- Use fermented bio-liquid fertiliser in the fertiliser pile to accelerate decomposition.
1.5.22 POST HARVEST FARM MANAGEMENT

**Technique/Method**

- After harvesting, spread fermented bio-liquid fertiliser, and sow sword bean seed in the field. Till to overturn the soil to cover straw.
- It is also possible to sow seeds of sesame, Thai melon, pumpkin, groundnut, and yam as human food.
- Apart from enriching the soil, tilling the soil to cover straw also helps prevent wild fires on farmland.
- Animal raising helps to consume the straw in the rice field.

- Trim field dyke fruit trees.
- All bio-fertilisers may be replaced by tilling the soil to cover straw for 2 to 3 years.

Farmer filling in spaces after main transplanting has been completed

1.6 Calendars of Annual Activities for Organic and Inorganic Rice Production

1.6.1 CALENDAR OF ANNUAL ACTIVITIES FOR ORGANIC RICE PRODUCTION

The following table shows the annual activities for organic rice production.

**Table 2 Calendar of Annual Activities for Organic Rice Production**

<table>
<thead>
<tr>
<th>Month</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>Improve production structure on farm, such as using power tiller to repair rice field dykes, cultivation of other crops after rice harvest, preparation of fermented bio-liquid fertiliser, getting organised to prepare organic fertiliser, selling yield, preparation of compost on farmland.</td>
</tr>
<tr>
<td>February</td>
<td>Grow crops after rice harvest, till the soil to cover rice straw, getting organised in a group for processing and preparation of compost.</td>
</tr>
<tr>
<td>March</td>
<td>Preparing compost from leaves, harvesting of crops grown after rice, preparation of compost.</td>
</tr>
<tr>
<td>April</td>
<td>Grow green fertiliser crops on farmland, install water system on farmland, repair rice field fences, seed exchange, apply compost and cow dung on farmland.</td>
</tr>
<tr>
<td>May</td>
<td>Training on organic standards, planning for farmland, collect green fertiliser seeds, first ploughing, acquire Jasmine rice seed, prepare plots for seedlings.</td>
</tr>
<tr>
<td>June</td>
<td>Levelling plough, till the soil to cover green fertiliser plants, spread cow dung on farmland, grow seedlings, second ploughing and levelling.</td>
</tr>
<tr>
<td>July</td>
<td>Transplanting or sowing rice, grow perennial trees, raise fish on farmland, maintain earth dykes.</td>
</tr>
<tr>
<td>August</td>
<td>Weeding, management of water on farmland, spread fermented bio-liquid fertiliser on farmland, repair rice field dykes, grow perennial trees, apply fertiliser for trees.</td>
</tr>
<tr>
<td>September</td>
<td>Regular maintenance of farmland, apply organic fertiliser, organise group to make household items.</td>
</tr>
<tr>
<td>October</td>
<td>Maintain farmland, collect seeds, weeding.</td>
</tr>
<tr>
<td>November</td>
<td>Harvest rice, till soil to cover straw, grow Jack beans, collect seeds, select rice varieties.</td>
</tr>
<tr>
<td>December</td>
<td>Gather yield, threshing, drying, gather grain and deliver to rice mill, collect rice seeds, grow crops after rice harvest.</td>
</tr>
</tbody>
</table>
1.6.2 CALENDAR OF ANNUAL ACTIVITIES FOR INORGANIC RICE PRODUCTION

For inorganic rice cultivation, farmers applied chemical fertiliser, but did not use herbicides or pesticides. Normally, inorganic rice farming practices are similar to organic rice farming, except that chemical fertiliser is applied. Normally, farmers apply chemical fertiliser to seedling beds and then again in July and August. Farmers stated that they observe the field and apply chemical fertiliser to the areas where the paddy is not healthy. The following table shows the annual activities for inorganic rice cultivation.

Table 3 Calendar of Annual Activities for Inorganic Rice Production

<table>
<thead>
<tr>
<th>Month</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>- Improve infrastructure in the field, repair rice bunds</td>
</tr>
<tr>
<td></td>
<td>- Collect organic matter and make compost</td>
</tr>
<tr>
<td></td>
<td>- Store seed</td>
</tr>
<tr>
<td></td>
<td>- Sell paddy</td>
</tr>
<tr>
<td></td>
<td>- Collect rice straw for animal feed</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>February - March</td>
<td>- Collect organic matter and make compost</td>
</tr>
<tr>
<td></td>
<td>- Grow vegetables, red onions and garlic</td>
</tr>
<tr>
<td></td>
<td>- Take cattle to browse in the field</td>
</tr>
<tr>
<td></td>
<td>- Collect red onions and garlic</td>
</tr>
<tr>
<td></td>
<td>- Some farmers find work in Bangkok</td>
</tr>
<tr>
<td>April</td>
<td>- Transport animal manure and compost to the field</td>
</tr>
<tr>
<td></td>
<td>- Take cattle to browse in the field</td>
</tr>
<tr>
<td></td>
<td>- Collect organic matter and make compost</td>
</tr>
<tr>
<td>May</td>
<td>- Plough rice straw into the soil</td>
</tr>
<tr>
<td></td>
<td>- Harrowing</td>
</tr>
<tr>
<td></td>
<td>- Buy chicken manure</td>
</tr>
<tr>
<td></td>
<td>- Prepare seedling bed and apply chemical fertiliser</td>
</tr>
<tr>
<td></td>
<td>- Collect organic matter and make compost</td>
</tr>
<tr>
<td>June</td>
<td>- Apply compost to the field and harrow</td>
</tr>
<tr>
<td></td>
<td>- Broadcasting</td>
</tr>
<tr>
<td></td>
<td>- Transplanting</td>
</tr>
<tr>
<td>July</td>
<td>- Apply chemical fertiliser</td>
</tr>
<tr>
<td></td>
<td>- Broadcasting</td>
</tr>
<tr>
<td></td>
<td>- Transplanting</td>
</tr>
<tr>
<td>August</td>
<td>- Manual weeding</td>
</tr>
<tr>
<td></td>
<td>- Control water level</td>
</tr>
<tr>
<td></td>
<td>- Collect chemical fertiliser</td>
</tr>
<tr>
<td></td>
<td>- Collect grass for animals</td>
</tr>
<tr>
<td>September</td>
<td>- Manual weeding</td>
</tr>
<tr>
<td></td>
<td>- Control water level</td>
</tr>
<tr>
<td></td>
<td>- Observe fields, visit other farms</td>
</tr>
<tr>
<td></td>
<td>- Collect grass for animals</td>
</tr>
<tr>
<td>October</td>
<td>- Manual weeding</td>
</tr>
<tr>
<td></td>
<td>- Control water level</td>
</tr>
<tr>
<td></td>
<td>- Observe fields, visit other farms</td>
</tr>
<tr>
<td></td>
<td>- Collect grass for animals</td>
</tr>
<tr>
<td>November</td>
<td>- Harvesting</td>
</tr>
<tr>
<td></td>
<td>- Threshing and drying</td>
</tr>
<tr>
<td></td>
<td>- Transport to the mill or granary</td>
</tr>
<tr>
<td></td>
<td>- Select seed</td>
</tr>
<tr>
<td>December</td>
<td>- Harvesting</td>
</tr>
<tr>
<td></td>
<td>- Threshing and drying</td>
</tr>
<tr>
<td></td>
<td>- Transport grain to the mill or granary</td>
</tr>
<tr>
<td></td>
<td>- Select seed</td>
</tr>
<tr>
<td></td>
<td>- Sell paddy</td>
</tr>
<tr>
<td></td>
<td>- Grow vegetables, red onions and garlic</td>
</tr>
</tbody>
</table>
2. RICE CULTIVATION INNOVATIONS TESTED BY FARMERS

2.1 Summary of Innovations Tested

Farmers in Sokkumpoon and Kudhin Villages (Kudchum District, Yasothon Province, northeast Thailand) planned to test soil improvement and seed selection technologies. In addition, two farmers carried out a trial of a technique in which paddy plant leaves are cut. The following table shows the innovations tested and number of farmers involved.

<table>
<thead>
<tr>
<th>Innovation tested</th>
<th>Purposes</th>
<th>Number of farmers involved</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Soil improvement</strong></td>
<td>To improve soil fertility and increase yield</td>
<td>10 organic farmers</td>
<td>Farmers preferred to practice two or three methods of organic fertilization.</td>
</tr>
<tr>
<td>- Animal manure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Fermented bio-liquid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Green manure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- To become independent from external inputs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- To reduce the costs of production</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- To minimize the use of chemical fertilisers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- To reduce the costs of production</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Native seed selection and development</strong></td>
<td>- To promote the use of native varieties</td>
<td>4</td>
<td>One farmer owned 6 native varieties, another owned 4, and two owned 3 native varieties.</td>
</tr>
<tr>
<td></td>
<td>- To campaign against GE seeds</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Paddy leaf cutting</strong></td>
<td>- To increase yield</td>
<td>2</td>
<td>The yield is increased; plants had more grains per panicle.</td>
</tr>
<tr>
<td></td>
<td>- To minimize weeds</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.2 Soil Improvement

Soil improvement is considered to be the most important factor in rice cultivation. Until about 30 years ago, the soil was fertile and farmers only applied animal manure and compost to enrich the soil. However, chemical fertilisers were introduced during the promotion of new agricultural technology in the green revolution, and rapidly adopted by farmers. When farmers later shifted to organic farming, they tested and developed techniques suitable to their needs and conditions. Some techniques in fact are not new but have been practiced and passed on from generation to generation.

2.2.1 Animal Manure

In northeast Thailand, farmers raise cattle, and organic matter mixed with animal dung is common. Almost every household has a cattle shed where they add organic matter such as rice straw or leaves for the cow to stand on. They also apply fermented bio-liquid to stimulate fermentation. When the organic matter is too wet, they add more organic matter, when it is too dry, they water the shed. Some farmers apply fermented bio-liquid to the shed for fast fermentation and to eliminate unpleasant smells.

How to use animal manure:

(1) In a seedling bed
- Apply about 80 kg per rai (500 kg/ha).
- Transport to the bed and leave for one week before ploughing.

(2) In a field
- Apply fermented animal manure to the field in April-May and immediately plough it into the soil. (15 farmers)
- Transport fermented animal manure to the field (April-May) and leave it for 2-3 weeks before ploughing it into the soil (3 farmers)
- Transport fermented animal manure to the field in late April-early May, before first ploughing, leave for 2-3 weeks, apply manure evenly; after 20 days carry out second ploughing to mix it into soil (2 farmers)
- 1-2 months after transplanting, sow manure in the area where the rice does not grow well.

Observations
- If chicken manure is used, it should not exceed 500 kg per rai. 250 kg per rai is recommended;
- Fermented animal manure should not be left in the field for a long time as the soil will become salty. 2-3 weeks is recommended;
- Applying animal manure during the pregnancy stage is not recommended. It is a waste of organic matter.
2.2.2 Fermented Bio-liquid

This is one of the most popular techniques used by organic farmers. It is easy to use and gives good results. It is easy to find the materials, and it can be used over a long period.

How to make fermented bio-liquid – three recommended methods

1. Mix vegetables, fruit, left-over food from the kitchen with neem leaves and bauraphet stems.
   • Mix 3 kg of vegetables, fruit and food from the kitchen, neem leaves, and bauraphet stems together with 1 kg of molasses. Fermentation period: 3 months
   • Mix 3-4 kg. of neem leaves, 3-4 kg. of bauraphet stems, food from the kitchen and half kg of molasses, add water and cover with plastic. Stir the materials at first. Fermentation period: 5-6 months

2. Mix vegetables and fruit
   • Ingredients: Kang kong (water spinach), banana trunk, ripe mango, ripe banana, pineapple.
   • Three kg of chopped kang kong are mixed with 1 kg. of molasses, add water and left for fermentation for about 3 months. Stir the materials once a week.
   • Three kg of chopped kang kong, are mixed with 650 gram of molasses; cover with 350 gram of molasses, add water and cover with plastic. Fermentation period: 7-10 days.
   • 1 kg of molasses is mixed with 4 kg of ripe fruit Recommended ratio: 1 kg of molasses: 3 kg of fruit or vegetables.

3. Mix vegetables, fruit, left-over food from the kitchen, and fish
   • Mix 3 kg of food from the kitchen, left-over fish or fermented fish, and fruit with 1 kg. of molasses; add water. Fermentation period: 4-5 months.
   • Mix food from the kitchen and fish (3 parts) with molasses (1 part) and add water (8 parts). Fermentation period: 5-6 months.
   • Mix food from the kitchen, fermented fish and banana trunk (1 part) with molasses (1 part). Fermentation period: 1 month.
How to use fermented bio-liquid:

(1) Use in seedling bed
- Apply to seedling bed at a rate of 5 litres per rai.
- Soak seeds in fermented bio-liquid with water overnight before sowing.

(2) Use during harrowing
- Mix concentrated juice with water and spray on the field. Some farmers put diluted fermented bio-liquid in a plastic container and tie it to the tractor. They then make holes in the container and spray the fermented liquid while harrowing.

(3) Use after transplanting
- Pour diluted fermented juice onto the field or spray during June and July.
- Spray during pregnancy period.

(4) Use in animal manure pit
- When preparing animal manure, mix diluted fermented juice into the organic matter to stimulate fast fertilization and reduce smells.

Observations and recommendations
- Green materials will give higher nitrogen. If smell is too strong, add rice bran
- Spraying during the pregnancy stage will stimulate the growth of grain
- Should be used with other methods (e.g. animal manure or green manure)
- Spray only diluted fermented bio-liquid, and use 1 week after transplanting

2.2.3 Green Manure

Sesbania Rotrata, sword bean, bush bean, mung bean, and peanuts are used. Sword beans are very popular because they are easy to grow and give good results.
- Broadcast 7-10 kg/rai (44-62 kg/ha) in April-May, allow to grow to flowering stage, then plough the plants into soil. Leave for 7-20 days before transplanting.
- When grown in December-March, broadcast in January and plough in March or April.
- Broadcast together with rice seed (10 kg/rai) and leave it to ferment when water is allowed into the field.
- Broadcast in December and collect the seeds in April. Plough into the soil and leave for 15 days before transplanting.

Green manure plants growing in paddy field

Sesbania Rotrata
- Grow near the bund until the plants bear seed, then chop the plants and cover the soil with them.
- Broadcast 5 kg of seed per rai in February and plough in April.

Mung Beans
- Broadcast 3-5 kg/rai in April or May. Mung beans are normally broadcast together with rice seed.
- Broadcast 1 kg/rai in December or January and plough into the soil the following April or May.

Observations
- Green manure provides organic materials for the soil and is easy to manage.
- The most popular green manure used in Kudchum is the sword bean. It is easy to grow, buffalo and cows do not like it, and it grows well in sandy soil containing organic substances.
2.3 Native Seed Selection and Development

Thai agriculture has had a long relationship with the rice cultivation system. It has been found that people in northeast Thailand have planted rice for food consumption since about 3,500 B.C. The development of the rice cultivation system is related to geo-ecological conditions. For example, in the upland and mountainous areas rice was inter-planted with chilli, cotton, sesame, and root crops. Later, rice was grown in the lowlands for better production and management qualities.

Just in the last four decades, the rice cultivation system has been improved in order to respond to the need for greatly increased production for commercial purposes. Farmers in different areas have local knowledge concerning rice varieties relevant to their geographical locations. This knowledge is derived from ancestral practices developed over many centuries, and has long contributed to the conservation and development of rice varieties.

Following the establishment of the Royal Rice Department in the late 1930s, the farmer’s role in rice variety conservation decreased and was consequently replaced by the government sector. New chemical-oriented rice varieties were broadly promoted as traditional and native varieties were ignored and eventually disappeared. It has been estimated that the number of Thai rice varieties has decreased from an original approximately 50,000 varieties to only 6,000 varieties today. Most of these varieties are conserved in the national rice bank. Considering the great danger of the loss of native rice varieties, groups of farmers and NGOs in northeast Thailand started to promote the development of native rice diversity. From a survey carried out by the Northeast Alternative Agriculture Network, a thousand varieties had disappeared from the region’s farms, but some farmers still owned some native rice varieties.

In Kudchum district, about 40 farmers are participating in the project on native rice variety development. The objective of the project is to promote the collection and development of native rice varieties. Farmers are encouraged to choose varieties they prefer and grow them on one part of their farms. Farmers come together to discuss the characteristics of each variety. They also exchange seed with group members who want to try new varieties.

It is found that farmers select varieties based on their taste preference, and suitability to their geo-ecosystem condition and cultural practices. For example;

- **Jao Loy** is a floating rice, suitable for cultivation in lowland and wetland areas.

- **Lao Taek** is large and round and each ear gives many grains. Its name indicates how much grain it yields; so much that the rice barn collapses! It is also soft and sticky. Lao Taek is good for making crispy rice chips.

- **Jao Daeng or red rice** is not for daily domestic consumption like sticky rice, but it is very important for religious and other festive activities, because it is used to make fermented rice noodles and local desserts. Maturity duration 120 days.

- **Khi Tom Yai** is tasty and can be fermented to make good rice wine, the taste of which depends on the variety of rice used. Formerly, villagers...
would prepare their own rice wine for drinking during religious ceremonies. Khi Tom Yai was kept from generation to generation as it makes good wine. Maturity duration 210 days.

**Nangnuan** is sticky, aromatic and soft. The grain is fat and this variety is suitable for cultivation in saline soil. This variety has a renowned fragrance and it was cooked for daily consumption. Maturity duration 149 days.

**Sanpatong** is sticky and suitable for cultivation in lowland areas. It originated in northern Thailand, but is also widely grown in the northeast. It has good resistance to pests and disease. It also has good taste properties and gives large amounts of grain. It is good for making rice wine and desserts. Maturity duration 140 days.

During a workshop to exchange data on rice varieties and their characteristics, farmers stated that there were 17 varieties (14 glutinous, and 3 non-glutinous) found in Kudchum, Sai Moon, Patiew and Muang Districts in Yasothon Province (see Table 5). However, farmers only grew native varieties on a small portion of the land. If farmers wish to grow new varieties they are not familiar with, they will not cultivate a large area at first.

They will first try out different varieties on small plots to see which varieties are suitable for their climatic conditions and environment, and which ones will give a better yield. A particular variety may give a better yield, but not be palatable, and so they will not continue to grow that variety. In addition, local varieties do not sell well. Farmers know best which varieties are good for them. During the meeting, farmers also planned to test which varieties were good for their own conditions and preferences. They exchanged seed for trial cultivation and exchanged knowledge of the varieties with each other.

The farmers attending the workshop agreed to select good varieties of Jasmine rice seed and other native varieties, and planned to exchange seed with other farmers in the region during the forum on native seeds held in April 2005. Farmers also stated their intention to campaign on farmers rights over genetic resources at the level of government policy.

**Table 5 Characteristics of Native Rice Varieties Collected by Farmers in Yasothon Province**

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Characteristics</th>
<th>Strength / weakness</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Khi Tom Yai</strong></td>
<td>Glutinous, 210 days Strong stem; large leaves and grain, 3-5 seedlings per hill; little fragrance. Grows well on both lowland and wetland.</td>
<td>• Strong stem; large grain and can survive during flooding, tall and gives good grain, easy to harvest. • Easily attacked by stem borer.</td>
<td>Good for making rice wine.</td>
</tr>
<tr>
<td><strong>Nangnuan</strong></td>
<td>Glutinous, 149 days 11-14 seedlings per hill; medium grain, good fragrance and grows well on sandy soil containing organic matter.</td>
<td>• Good fragrance.</td>
<td></td>
</tr>
<tr>
<td><strong>Sanpatong</strong></td>
<td>Glutinous, 140 days; 160 cm tall, long grain, grows well on lowland and sandy soil containing organic matter.</td>
<td>• Good fragrance, • Good pest resistance • Strong stem • Good drought resistance • Good taste • High yield</td>
<td>Good for making rice wine and desserts.</td>
</tr>
<tr>
<td>Varieties</td>
<td>Characteristics</td>
<td>Strength / weakness</td>
<td>Note</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Pla Keng</td>
<td>Glutinous, 82 days; Strong stem, 110 cm tall, 15-20 seedlings per hill; grows well on upland fields.</td>
<td>• Good pest resistance. • High yield.</td>
<td>--</td>
</tr>
<tr>
<td>Lao Taek</td>
<td>Glutinous, 180-200 days, 155-160 cm tall, strong stem, large leaves and large soft grain, high yield.</td>
<td>• Grows well on wetland or any area with good water resources. • Good drought resistance. • Easily attacked by stem borer.</td>
<td>Good for making rice chips.</td>
</tr>
<tr>
<td>Pong Aew</td>
<td>Glutinous, 138 days, 5-10 seedlings per hill, long grain.</td>
<td>• Grows well on upland fields.</td>
<td>Good for making desserts. Early harvest.</td>
</tr>
<tr>
<td>Dor Ma Horn</td>
<td>Glutinous, strong stem, large leaf, short grain, good fragrance.</td>
<td>• Grows well on upland fields.</td>
<td>Good for making rice chips, desserts, and wine.</td>
</tr>
<tr>
<td>Pon Tuk</td>
<td>Glutinous, tall with large leaves, fat grain.</td>
<td>• Grows well on upland fields.</td>
<td>Good for making rice chips, and desserts.</td>
</tr>
<tr>
<td>Dor Rai</td>
<td>Glutinous, 90 days, 90 cm tall, 5-7 seedlings per hill.</td>
<td>• Grows well on upland fields. • Early harvest. • Easily attacked by pests. • Low yield.</td>
<td>Good for making rice chips, and desserts.</td>
</tr>
<tr>
<td>Niew Dor</td>
<td>Glutinous, 90 days, 180 cm. tall, strong stem, 8-10 seedlings per hill, medium fragrance, soft grain.</td>
<td>• Good for upland. • Early harvest. • Easily attacked by thrips.</td>
<td>--</td>
</tr>
<tr>
<td>Dor Boon Ma</td>
<td>Glutinous, 90 days, Long, strong stem, large leaves, 6-7 seedlings per hill, soft grain, medium fragrance.</td>
<td>• Grows well on upland fields. • Early harvest.</td>
<td>Good for making rice chips.</td>
</tr>
<tr>
<td>Dor Dook Ngu</td>
<td>Glutinous, 90 days, Strong stem, 4-7 seedlings per hill, long but small, soft grain.</td>
<td>• Small, soft grain.</td>
<td>Good for making local desserts.</td>
</tr>
<tr>
<td>Kao Kam</td>
<td>Glutinous, 110 days, Dark colour, black seed, strong fragrance.</td>
<td>• Strong fragrance. • Rice straw is not recommended for feeding cows and buffalos.</td>
<td>Good for making local desserts and wine. Believed to be the mother of all rice.</td>
</tr>
</tbody>
</table>
## Varieties

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Characteristics</th>
<th>Strength / weakness</th>
<th>Note</th>
</tr>
</thead>
</table>
| **Dor Hang Hee** | Glutinous, 100 days, Strong stem, large leaves, 8-10 seedlings per hill, long, soft grain. | • Grows well on saline soil.  
• Good drought resistance.  
• Easy to harvest. | Good for making local desserts. |
| **Jao Daeng** | Non-glutinous, 110-120 days, large leaves, red seed. | • Grows well on upland fields.  
• Easy to harvest. | Good for making rice noodles. |
| **Red Jasmine** | Non-glutinous, 120 days; Short roots, long leaves, long grain, 10-12 seedlings per hill, soft grain, and good fragrance. | • Good disease resistance.  
• Good threshing properties. | High nutrition but small market compared to white Jasmine. |
| **Jao Loy** | Non-glutinous, 10-20 seedlings per hill; Floating rice which grows well on wetland. | • Floating rice.  
• Low yield.  
• Difficult to harvest. | Good for making local noodles and desserts. |

### Stock seed production and selection as practiced by farmers.

1. Select an appropriate area for growing the stock plants. This should be in the middle of a plot of the variety planned for selection.
2. The area should not be too high or too low and have good water management.
3. Regularly inspect the plot to prevent damage by pests, and carry out weeding.
4. Regularly uproot abnormal rice plants, such as those with early development of ears, disease infection, abnormal shooting, irregular height, and so on.
5. Harvest separately from other rice when leaves turn brown.
6. Tie the grain together and dry for a few days. Collect the seeds in the morning.
7. Select ears before threshing.
8. Store in a sack separate from other grains, and label the sack “for stock”.
9. The grain should not have a humidity of more than 13%.

### Seed preparation before planting

**For transplanting:**

- Select only good and mature grain.
- Soak grain in water for two nights.
- Prepare seed bed: apply compost evenly.
- Water level should be 10-20 cm, drain the water out the following morning.

**For broadcasting:**

- Select only good and mature grain.
- Plough the soil and sow the seed on the field evenly.
- Harrow.

---

Preparation the seedling bed
2.4 Cutting of Paddy Plant Leaves

Two farmers practiced the technique of cutting paddy leaves. They both tried the technique in 2003/04 and found that the yield increased. They tried the technique again in 2004/05. The objective of cutting paddy leaves is to increase yield and minimize weeds.

2.4.1 Method

- Broadcast the seed in early May.
- Drain the water out of the field before cutting the leaves.
- Cut the leaves about two inches from the bottom. This should be done in August (two months after broadcasting).
- Cover the soil with the leaves.
- After three days, allow water into the field.
- After one week, the height of the paddy will be about 12 inches.
- After 15 days, the height of the paddy may be as high as 50-70 cm.

2.4.2 Result

Paddy grows quickly and evenly after cutting the leaves. The stems are strong and the grain grows well. The yield is increased. When the paddy leaves are cut, weeding is carried out at the same time.

However, this technique can be used only with broadcasting, not transplanting.

2.4.3 Observations

When the leaves are cut, the stem will be fully exposed to sunlight and grow faster. It is observed that the paddy has more grain but fewer leaves. Farmers also observed that there were fewer pests in the field.

One farmer noted that he cut paddy leaves only in areas observed to have more weeds, or where there are too many rice plants growing together in one place in the paddy field.
3. ORGANIC RICE MARKETING

3.1 Introduction and Background

The organic rice market in Thailand started in 1986 when a professor from Chulalongkorn University in Bangkok, who was a secretary of the Appropriate Technology Association, launched a “project on food for a good quality of life”. The project promoted organic rice and vegetables grown in Surin province. The produce was sold every Friday at Chulalongkorn University, and although the project was not very successful, it boosted consumer interest in organic produce. In 1992, the Alternative Agriculture Network organized the Alternative Agriculture Fair and Forum, a part of the activities of which was the sale of organic products. At the end of the fair, many consumers wanted to know where they could buy organic products. Since then, many green shops have opened and are selling green products both in Bangkok and other major Thai cities such as Chiang Mai, Khon Kaen, and Songkhla. As a result, many local groups and NGOs are promoting the development of sustainable agriculture (SA) and alternative markets.

Although there are many areas where farmers are producing organic rice, there are only two groups of farmers who have long experience of organic rice marketing and exporting to consumers in Europe. They are the Surin Farmers Support Group in Surin Province and the Nature Care Club of Kudchum District, Yasothon Province. The Nature Care Club was chosen as the case study for this pamphlet.

Kudchum District is located in Yasothon Province, 37 km from the provincial centre. Kudchum is known as the land of Jasmine rice. Like any other farmers in Thailand, the farmers of Kudchum District are mainly rice growers. In the past, farmers had to struggle to receive a better price for their produce, but at the end of the season, it always turned out that the rice price went down and farmers had no choice but to sell their rice to the middle man or the miller. Many farmers are in debt because they had to invest money to carry out the new technological methods introduced by the government during the green revolution. Farmers were advised to borrow money from the bank and purchase tractors, chemical fertilisers, and other chemical inputs. In Sokkumpoon and Kudhin Villages, farmers grew Jasmine rice for cash and RD 6 (glutinous rice) for household consumption. The rice price fluctuated and was unpredictable. Farmers could not set their own price, but had to abide by the market prices set by middlemen and private millers. For example, in 1991, the rice price went down to only 4,000 Baht ($148) per ton, and the villagers had no bargaining power with which to influence the price. Farmers started talking about alternative solutions in order to gain more bargaining power.

In 1983, key farmers’ leaders and a doctor from Kudchum Hospital started to discuss the potential
of farmers as traditional healers and began to share their knowledge on herbal medicine. They agreed to set up the “Traditional Doctor Association”, and since they can easily find raw materials with which to make medicines, they agreed to establish the Herbal Medicine Center at Tha Lad Temple. In 1984, an NGO called “The Project on Herbal Medicine for Self-Reliance” started a project to promote herb use for self-reliance in Sokkumpoon Village. Farmers were interested and were encouraged to grow herbs on their farms. In 1985, two farmers attended a meeting on integrated farming organized by the Alternative Agriculture Network, as they were interested in the system and techniques used. Soon after they came back, they started to dig small ponds and grow many kinds of crops and fruit trees. The Herbal Medicine Center and the Project on Herbal Medicine for Self-Reliance played an important role in promoting integrated farming in the villages. Farmers were encouraged to develop appropriate technology and techniques. Fortunately, very few farmers applied chemical pesticides, but they still applied chemical fertilisers together with animal manure. Farmer cross-visits were organized for farmers to learn from each other. Training on SA concepts and techniques was organized. The concepts and patterns were proven and experimented on by farmers, and SA has expanded to other villages.

During 1985-1987, farmers observed that many fish in the rice fields and natural ponds died because of heavy use of chemical fertiliser. As a result, more farmers shifted to organic rice farming.

In 1990, the Project on Herbal Medicine for Self-Reliance invited Mr. Masanobu Fukuoka, a well-known natural farming rice farmer from Japan, to visit farmers in northeast Thailand. During the trip he visited Sokkumpoon Village and visited some integrated farms. He shared his ideas and concepts on natural farming with the farmers. Farmers became more confident when visitors came and shared concepts and practices of natural farming with them. More farmers shifted to growing organic rice and integrated farming. Several techniques have been developed to reduce the use of chemicals. Farmers are encouraged to keep their own seed and exchange seed with other farmers.

3.2 The Nature Care Club and the Organic Rice Mill

In 1990, local farmers organized a meeting for SA farmers and agreed to set up the “Nature Care Club”. The objectives were (1) to support farmers growing organic rice for the food and health safety of the producer and consumer; (2) to encourage farmers to shift from monocultures to a diversified farming system; (3) to act as a marketing agent to buy and sell paddy under a fair trade concept; (4) to be a forum for farmers to learn and share experiences on management of farm activities and agricultural problem-
In 1991, the Nature Care Club set up a rice mill in Sokkumpoon Village to process organic rice, and carry out rice marketing for its members. In the beginning, farmers conducted research on market needs and possibilities in order to select the best location for the mill. They agreed to select Sokkumpoon Village as the pilot area because there were many farmers practicing organic farming there, the key leaders were willing to join, and also one of the farmers’ leaders was willing to donate land for the construction of the rice mill. At first, they had no plan to build a mill, but after long consultation, they realized that it was necessary to separate the milling of organic rice and inorganic rice. Farmers also felt a need to have their own mill and to be able to carry out their own rice milling and marketing. The farmers hoped that by owning their own mill and carrying out their own rice trade they would gain more benefits and have greater bargaining power over prices.

3.2.1 Fund Mobilization

Capital was one of the most important factors in setting up the rice mill and running the rice business. Farmers mobilized funds through a process of consultation among themselves, leading to the selling of shares to the farmers at 100 Baht per share. (In 1996, this was changed to 10 Baht per share.) In addition, NGOs and consumers in Kudchum and Bangkok set up the “Friends of Nature Association”, to support the activity on herbal medicine development and SA, and they also invested in shares. The club was able to raise 300,000 Baht ($7,500), but this was not enough for construction of the mill, despite the willingness of farmers to contribute in kind; for example, one villager donated the land for construction, while others were prepared to bring wood or come to help during the construction. They then received advance orders from the Friends of Nature Association and the Child Foundation for another 400,000
Baht ($10,000). With 700,000 Baht ($17,500), the first organic rice mill began construction in February 1991 and started operation in late August 1991. The mill’s capacity is 24 tons per day (operating 24 hours per day), or one ton per hour. At the end of 1991, there were 52 farmers practicing organic rice farming in 11 villages in Kudchum District. They all deposited their paddy at the mill.

### 3.2.2 The Second Rice Mill

The second rice mill was constructed in 1999. After almost nine years experience, the business had expanded and the first rice mill could no longer cope with the increased amount of paddy. In addition, the first rice mill is located right in the centre of the village, so that when it operated the village was covered with dust, which the villagers considered to be pollution. The second rice mill cost 2.8 million Baht and is located about one kilometre from Sokkumpoon Village. The mill serves as the club office, and the paddy drying and storage location. The mill’s capacity is 60 tons per day (operating 24 hours per day). In addition, the club received financial support from the Thai Department of Cooperatives to build a 500-ton capacity warehouse and 5,000 square meters of drying area. The Social Investment Fund also donated 1.2 million Baht to build a training centre, a co-op shop, and to buy a 40-ton capacity weighing scale.

As of December 1994, there were 369 farmers/share-holders, Bangkok consumers and local government officers being among the other investors. In 1999, there were 1,041 members from 85 villages in 19 sub-districts, and 5 districts. Among these, 240 were pesticide-free rice growers, covering an area of 1,000 rai (160 ha.) and 34 organic rice growers, covering an area of 500 rai (80 ha) or producing about 140 tons annually.

In 2004, there were 231 organic rice growers, covering an area of 6,700 rai (1,072 ha); and 92 first-year organic rice growers (in the transition period), covering an area of 2,586 rai (414 ha). The total amount of paddy produced was 1,090 tons (814 ton of organic paddy and 276 ton of organic paddy in the first year of transition). Among these, there were 71 farmers from Kudhin Village (50 organic rice farmers and 21 in the first year of transition), and 199 organic farmers from Sokkumpoon Village (136 organic rice farmers and 63 in the first year of transition).

### 3.2.3 Benefits and Rights of Shareholders

Members have the right to approve regulations which affect members, such as rules for depositing rice or the interest rate of savings.
The main rights of shareholders are:
• To select the mill committee members,
• To approve the balance sheet and agree on the profits and dividends to the members;
• To attend meetings and receive annual reports,
• To change or revise mill rules and regulations when necessary.

3.2.4 Membership requirements

Who may be a member of the club? The members are farmers who are interested in SA. Some are members of the community cooperative fund, some are members of the Tha Lad Herbal Medicine Center, while many joined the club because they were interested in the activities. It is observed that not all members could produce organic rice to supply to the mill. They may deposit their share, but they do not necessarily grow organic rice. This is because the process in shifting to organic practices requires intensive management, and many members still want to wait and see the results of others. Those who want to grow organic rice have to apply and register with the club between January and April each year. Applicants must submit their farming details such as land area, number of working people, history of chemical use, number of animals, and a farming plan. This record helps the club and the inspector follow up on farm activities properly.

3.2.5 Activities

The mill’s activities are to:
• Sell off by-products such as rice husks, rice bran, and seeds to the farmers at reasonable price.
• Store deposited paddy. Normally, the rice price goes down during November and December, so most farmers do not want to sell paddy during this period. However, they do not have enough space to store it themselves, so the mill provides this service for its members. Members can deposit paddy and sell it at anytime they wish, or when they can get good price for it. Normally, the mill checks the rice price every day and posts it in front of the office. In this way, farmers can easily make a decision on whether to sell their paddy or keep it stored. This system benefits both farmers and the mill. Farmers can wait for a good price while the mill can, at the same time, mill rice and sell it on the market, or sell paddy directly when they receive orders.
• Act as banker. The mill also encourages members to deposit money with the mill, which acts as a bank, giving a rate of interest one percent higher than normal banks.

Packing rice products
3.3 Management of the Mill

The mill is operated under the supervision and management of the mill committee, which is elected by the club members. Aside from the committee members, they also hire a manager, an accountant, and a secretary. The work of the mill is divided into two sections: processing of the paddy and marketing. The manager and the committee members play a crucial role in managing the mill and ensuring that it operates properly.

The club manages its activities through a managing committee consisting of 15 members. They come from different sectors, namely farming, NGOs and local government. The committee takes responsibility for overseeing the overall management and operation of the club, gives advice on the direction of the club, and helps to solve problems when necessary.

3.3.1 Price Guarantee

Farmers sell their paddy directly to the mill. Normally, the prices of organic paddy and first year transition period organic paddy are higher than inorganic paddy. There are three types of paddy purchased by the mill.

- **Glutinous paddy and inorganic paddy.** The mill buys the paddy from its members at a price 167 Baht per ton higher than the market price. Non-members receive the market price;

- **Chemical-free and first year transition period paddy.** The mill buys the paddy from its members at 250 Baht per ton higher than the market price;

- **Organic paddy.** The mill buys organic paddy at a guaranteed price of 10,000 Baht per ton.

There are two ways in which the mill buys paddy. Firstly, the mill buys paddy directly from the farmer. In the past, farmers had to pay transportation costs, but since the mill is located inside the village, they find it much easier to sell their paddy. For those who cannot transport their paddy to the mill, the mill provides a paddy transport service for its members. Farmers also feel comfortable in selling paddy to the mill, because they are involved in all processes of

- **Guarantee prices.** The mill will buy paddy from its members at a guaranteed price, but the price will also depend on the moisture of the grain measured. (The normal price for organic paddy is 10,000 Baht ($250) per ton).

- **Share profits.** At the end of the year, the mill will make a balance sheet and report profit and capital to its members. The members will receive a dividend, which depends on the profits each year.

The mill also manages its operation under the concept of no cheating and giving a fair price to all members. In this manner, the mill gains the trust and acceptance of the villagers.
sells and buys (quality check, measure of moisture content, weighing, and so on). Secondly, the mill buys paddy from farmer groups. There are seven such groups, two of which are community millers, and five are farmers networks. The two millers groups are extended members of the Nature Care Club, while the five farmers networks are groups of farmers who joined in with the activities of the Nature Care Club and later become members. The two mills and five farmers networks are:

1. Bak Rua Mill
2. Song Poey Mill
3. Kudhin Farmers Network
4. Yang Diaew Farmers Network
5. Sang Chang Farmers Network
6. Tung Tae Farmers Network
7. Thai Jaroen Farmers Network

These farmers networks and mills mobilize paddy from their members and supply it to the club. Normally, each group will have their own storage space, so they carry out their own business independently, but when the club needs extra supply, these networks can supply paddy directly and in a timely manner. In this way, the club does not have to retain large volumes of paddy at their own mill. These groups also benefit from selling paddy to the club. For example, in 2003, the club’s mill bought paddy from the networks at 200 Baht per ton higher than the market price. The club also pays an additional 50 Baht per ton for transportation. At the end of the year, they also receive a further bonus of 50 Baht per ton from the club.

3.3.2 Quality Control

Quality control is of great importance when selling organic rice to the consumer, especially when exporting to Europe. Early in the history of the mill, Green Net, a Thai NGO promoting organic agriculture and fair trade, invited a KRÄV inspector from Europe to inspect the process of organic rice production and to give advice to the farmers.

The Nature Care Club has established a dual quality control system. Firstly, members have to select their own seed, and should not mix the seed with any other seed, especially with seed from other mills. The mill also encourages farmers to grow and select good quality seed, and to change rice seed every three years. The mill provides good quality seed for its members to exchange. Non-members can also exchange rice seed with good quality seed at a ratio of 3:2 (normal rice seed : good quality rice seed).

Secondly, it is recommended that members voluntarily apply for membership with Organic Agriculture Certification, Thailand (ACT). Soon after they apply, they must follow the standards set by ACT. ACT has allowed the club to develop a system of group guarantee and use the social system, in which members act as controllers for

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3 KRÄV is a Swedish organisation working for the expansion of organic production.
each other, for controlling the rice production process. An ACT inspector also visits members if necessary.

The mill has also applied for inspections from ACT and thus the mill must also follow the advice and standards set by ACT. An ACT inspector inspects the operation of the mill and issues certification to the club every year.

### 3.3.3 Marketing Channels

**Local Market.** Normally, the club sells rice through both the normal market and the organic market. For the normal market, the club sells rice to local consumers in Kudchum District. They also sell rice to retail shops in Kudchum. Customers for organic rice and chemical-free rice are nurses, doctors, teachers and other middle class people who know about and are concerned about health and environmental issues. In Bangkok, the Friends of Nature Association sells rice under the brand “Thungluangthong”. It is sold in general stores, the Friends of Nature store, and BIG C Super Centers. According to the records of the Friends of Nature store, they are able to sell 8-10 tons of rice per year. Rice sold to consumers is packed in two sizes: 2 kg and 5 kg. Prices are as follows (Tables 6 and 7):

#### Table 6: Price of Rice Sold at the Friends of Nature Store

<table>
<thead>
<tr>
<th>Type of rice</th>
<th>Price Baht ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Brown rice</strong></td>
<td></td>
</tr>
<tr>
<td>2 kg</td>
<td>58 ($1.5)</td>
</tr>
<tr>
<td>5 kg</td>
<td>132 ($3.3)</td>
</tr>
<tr>
<td><strong>White rice</strong></td>
<td></td>
</tr>
<tr>
<td>2 kg</td>
<td>62 ($1.55)</td>
</tr>
<tr>
<td>5 kg</td>
<td>146 ($3.65)</td>
</tr>
</tbody>
</table>

In addition, the Nature Care Club, in collaboration with Bak Rua Mill, sell rice directly to Amway, Thailand and Bang Jak Petrochemical Company for repackaging and sale under their own brand.

#### Table 7: Types of Rice Sold by Nature Care Club (2004/05)

<table>
<thead>
<tr>
<th>Type of rice</th>
<th>Brand Name</th>
<th>Amount (Tons)</th>
<th>Price (Baht/Kg)</th>
<th>Outlet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normal rice</strong></td>
<td>Thungluangthong (Silver), Rice number 5 (Bang Jak Petrochemical)</td>
<td>4,800</td>
<td>20</td>
<td>General stores. BIG C Super Centers.</td>
</tr>
<tr>
<td><strong>Chemical-free rice</strong></td>
<td>Thungluangthong (Gold)</td>
<td>100</td>
<td>22</td>
<td>Friends of Nature and local markets.</td>
</tr>
<tr>
<td><strong>Organic rice</strong></td>
<td></td>
<td>246</td>
<td>24</td>
<td>Friends of Nature and abroad, mainly in Europe.</td>
</tr>
<tr>
<td><strong>Organic rice</strong></td>
<td></td>
<td>684</td>
<td>28-30</td>
<td>Abroad, mainly in Europe.</td>
</tr>
</tbody>
</table>
Note: The club has four standards of rice. Normal rice is inorganic rice. Pesticide-free rice is rice grown using chemical fertiliser, but with no use of chemical pesticides, insecticides, or herbicides. Organic rice (transition period) is rice grown organically during the first year of transition from chemical to organic farming. Organic rice is grown organically with the complete absence of chemical inputs following the second or subsequent year of the shift from chemical to organic farming.

For exports, the Nature Care Club gained support from Green Net / Earth Net Foundation from an early stage. Green Net acts as an exporter for local groups and also develops green markets in Thailand. For rice, Green Net’s contact in Europe is OS3, based in Switzerland. OS3 works with consumers on fair trade and promotes organic products in Switzerland.

3.3.4 Profit sharing

From its operations during the period 1991 to 2001, the mill made a profit of 4,151,704.32 Baht ($103,792.60). Dividends on profits are paid to members as follows:

1. **Profit sharing:** The club pays dividends based on the number of shares held by members;

2. **Added share:** The club pays dividends based on the amount of paddy sold and bought from each group each year. This is done only when business is good. For example, in 1996-97, the club paid back 100 Baht per ton to groups or mills, while in 2000, they paid back only 20 Baht per ton. However, in 1998, 1999 and 2002, no dividends were paid because business was not good.

3. **Community social welfare:** The club deducts a part of the profits from the business and puts it into a community social welfare fund. The objective is to help farmers, especially with health problems, children’s education, and also provide life insurance for the club’s staff and committee members. As of 2003, this fund contained 533,665.21 Baht ($13,341.62).
3.4 Problems and Obstacles

The group has run its rice business for many years, and has received much attention from farmers in Kudchum and other districts. The mill is operated in the village, and even inorganic farmers may sell their paddy to the mill. This reduces the cost of transportation. The mill thus has a large surplus of paddy. For example, when in 2004/05, the amount of inorganic rice held was large, the mill decided to join the price guarantee program of the Ministry of Commerce and received a 5-ton quota of inorganic paddy. In this way, they are able to reduce their stock.

According to the manager of the mill, the paddy surplus increased the following year, but orders remained the same. The mill manager had to negotiate with the government to receive more quotas on the price guarantee program to enable them to sell more paddy and reduce maintenance costs.

At present, only a few groups of consumers are concerned about fair trade issues and organic products. Consumers may be concerned about the effect of chemicals on health, but they still want to buy rice at a cheap price. When organic rice is displayed in normal markets, consumers are not able to distinguish between organic and conventional inorganic rice. Normal rice sold in the markets is also cheaper than organic rice sold by the club. It is necessary to work with consumers to create awareness of the benefits of organic produce and the importance of fair trade. Consumer-producer linkages will also help to strengthen the promotion of organic rice.

The price of rice on the market ranges from 18 Baht to 28 Baht per kilogram, depending on brand and quality. It has been found that some brands of Jasmine rice sold on the market are not 100 percent Jasmine rice, but are mixed with other varieties to reduce the cost. In this way, they can sell rice at a cheaper price, while the rice sold by the Nature Care Club is 100 percent Jasmine rice. To compete with normal rice sold widely on the market, there is a need to provide more knowledge to consumers. In addition, not all consumers like Jasmine rice. For example, labouring people and southern Thais prefer to eat harder rice and complain that Jasmine rice is too soft. Thus, there is a serious need to do more market research and consumer needs surveys. Farmers should be encouraged to grow local varieties and carry out educational campaigning with consumers in order to give them more knowledge about the quality of rice, both Jasmine rice and local rice varieties, so that both farmers and consumers have more options to choose from.