SOME GUIDELINES FOR GROWING RICE UNDER UPLAND (DRYLAND) CONDITIONS

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VARIETY

Successful rice farming greatly depends on the wise choice of high yielding varieties. The variety recommended for dryland rice culture in Papua New Guinea is called 'Senis. Senis is an early to medium maturing variety, with short plant height and high tillering capacity (i.e. the plants will form many heads of grain).

WHERE TO GROW RICE

To grow rice there should be about 1250 mm of rainfall over the growing period. For the first 3 months after sowing, and in the month before harvest at least 250 mm of rain per month are needed for the best yields. Low rainfall, especially during the flowering stage of rice, will reduce the yield of grain.

A crop of rice ready for harvest

The best soils for dryland rice are clay or clayey loam soils which hold water. For best results, plant rice in fertile soils which have not been cropped for many years, or on newly cleared bush.

Rice will grow in temperatures between 20°C and 40°C, but the best temperature for high yields is 22°C. Coastal areas of Papua New Guinea have average maximum daytime temperatures of 28-32°C. So in coastal areas where the rainfall and soils are suitable, temperature does not limit rice production. Using the rice varieties at present available in Papua New Guinea, successful rice production is limited to below 800 m a.s.l. Varieties tolerant to cold are needed above this altitude.

WHEN TO PLANT

Because of the high rainfall requirements of rice, it should be planted early in the wet season, so that the dry season comes late in the fourth month.

PLANTING

Seed

Plant 80-100 kg of rice seed per hectare. Before planting, spread the seed out in the sun to dry. This makes it easier to handle.

You can buy seeds at 10 toea per kilogram from the Agriculture Research Centre, Bubia. Seed can be saved from each year's crop for about 3 years, before you need to buy new seed from Bubia.

This article first appeared as Bubia Information Bulletin No. 45, June 1983.

Spacing

Plant the rice in rows 25-30 cm (or the width of a man's handspan) apart for the best yield and least weeding. Drill the seeds evenly along each row and cover to 2-3 cm deep. If the rice is planted with a dibbling stick, make holes 20-25 cm apart on the square. Plant 3 to 6 good seeds in each hole, and cover.

Preparing rows for drill seeding of rice

WEED CONTROL

The rice garden must be kept free of weeds for the first 9 weeks of rice growth, as weeds can cause a big reduction in grain yield. In newly-cleared gardens planted at the spacing recommended above, only two weedings are necessary before the rice plants are big enough to stop weeds growing. Three weedings may be needed on previously cleared land.

The plot of rice on the left has been hand-weeded. Compare it with the plot on the right!

The first weeding should be done 3 weeks after sowing; the second weeding should be done 3-4 weeks later, depending on the amount of weeds growing.

Chemical weed control is not economical for smallholder rice cultivation.

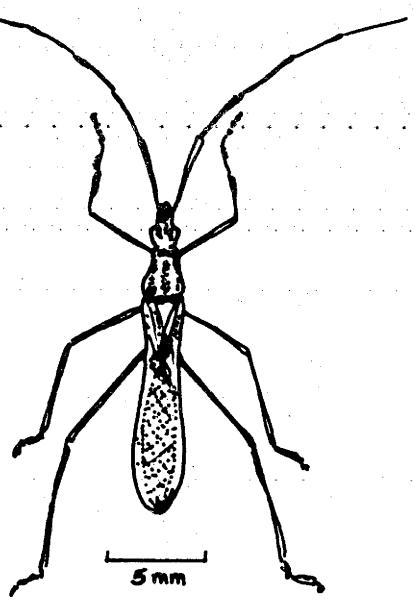
The use of crop rotation helps to control weeds, as well as reducing the build-up of insect pests and diseases of rice. Rotations with legumes such as peanuts, mungbeans or cowpeas are recommended. Legume crops also add nitrogen to the soil which is useful for the next crop of rice.

PESTS AND DISEASES

Because rice is not widely grown in Papua New Guinea, and because of strict quarantine regulations, many destructive pests and diseases of rice are not found here. Some insects which can be a problem are listed below.

Rice bugs (*Leptocorisa* sp.)

The 3 species of *Leptocorisa* found in Papua New Guinea (*L. solomonensis*, *L. oratorius* and *L. acuta*) are the most serious and widespread insect pests of rice in the country. They suck the sap of the developing grains, causing reduced yields and discoloured grains. Usually rice bugs attack a wide range of grass seeds, so rice production may be risky near grasslands.



Adult rice bug, Leptocorisa

Recommended methods of control are either spraying carbaryl at 0.9 kg a.i/ha or orthene (acephate) at 1.0 kg a.i./ha. In areas which have a fairly long dry season, *Leptocorisa* is effectively controlled by its natural enemies. Therefore insecticides must be used very carefully to kill *Leptocorisa* only, and not the other insects.

Stemborers

The pink stemborer (*Sessamia inferens*) is the most widespread of the stemborers. These insects bore into the stem of the rice, and chew out the centre portion. The damage is easy to recognise - during the vegetative (leaf-growing) stage the central leaf (youngest one) dies and turns brown. This is known as 'Dead heart'. If the plants have headed, the glumes turn white and this is often re-called 'White head'.

Usually chemical control of stemborers is not necessary. If stemborers are causing serious damage to your rice they can be controlled by applying Diazinon granules at a rate of 1 kg per ha. Make sure you apply Diazinon granules when there is enough rainfall to dissolve the granules.

Leaf-folders (*Cnaphalocrocis medinalis*) and leaf-rollers (*Marasmia poeyalis*)

Leaf-folders and leaf-rollers 'sew' together the two edges of leaves as houses for their larvae. This reduces the area of leaf available to make plant food and so also reduces the grain yield.

Young rice plants

Except for rice bugs, most insect pests are not usually a serious problem on the crop, and chemical control is not necessary. If an insect pest is damaging your rice badly, then you should consult your nearest D.P.I entomologist. The addresses of entomologists appear in all entomology bulletins (see p. 162 of this issue).

Rice diseases

Because of strict quarantine rules and the fact that very little rice is grown in Papua New Guinea, this country is still free from many serious diseases of rice. Rice blast has recently been reported in some rice plantings in the Rigo district of Central Province. See Plant Pathology Note No. 25 in HARVEST 10 (2).

HARVESTING

Time of harvesting

The rice variety Senis should be harvested 35-40 days after flowering. The flowering stage is taken to be when about 50% of the panicles have emerged. Do not wait longer than 35-40 days after flowering before harvest, or birds and rats will start to eat the crop. It can also be damaged by the sun.

Harvesting procedure

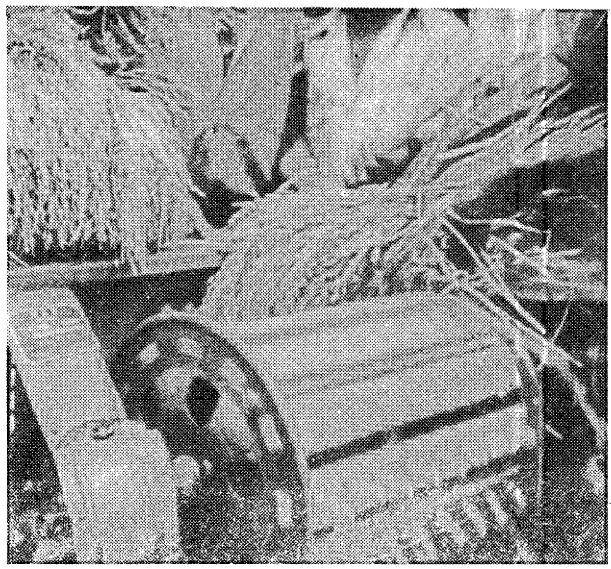
To harvest rice it is best to cut off the whole plant at ground level, using a knife or sickle. A sickle is a special knife which has teeth to make it easier to cut the stems with a single stroke.

THRESHING

Threshing is a way of separating the grain from the rest of the plant. Rice should be threshed immediately after harvest. Even if it is left overnight, fungus may begin to grow. A threshing frame is shown in the diagram.

Build your threshing frame from bush materials such as wood, pitpit or split bamboo poles. The table is made from poles lashed together with bush ropes. It should be as high as the level of your hands when you stand upright with your hands by

Harvesting rice using sickles



Threshing using a foot operated thresher

your sides. The walls of the threshing frame can be made of plastic sheeting, sacking, blinds or sleeping mats. Place canvas or some other covering on the floor beneath the frame, to catch the rice grains.

To thresh your rice, hold a bundle in two hands, at the base of the stems, then swing the heads hard against the table. Give the bundle a couple more short swings to release any loosened grains. Repeat this two or three times for each bundle, until all the grains have been shaken from the straw.

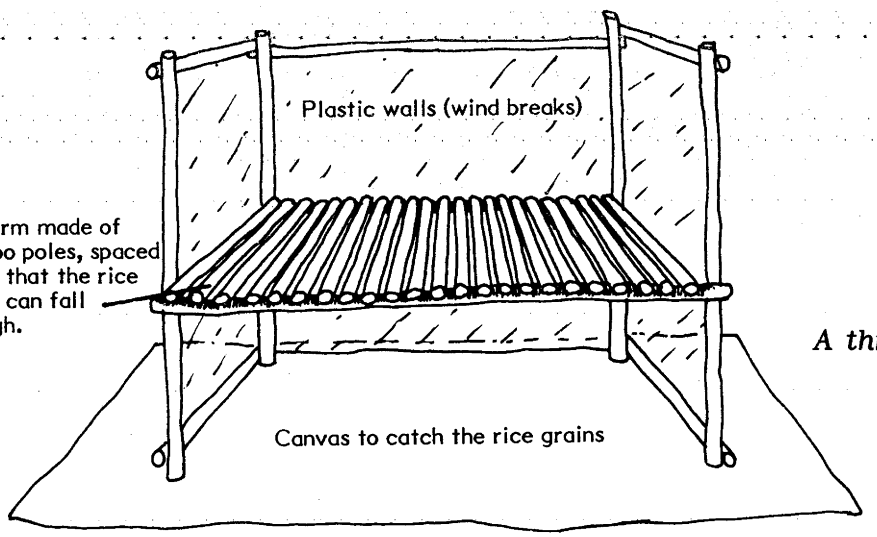
Threshing can also be done using machines, such as the foot thresher shown in the photograph.

DRYING

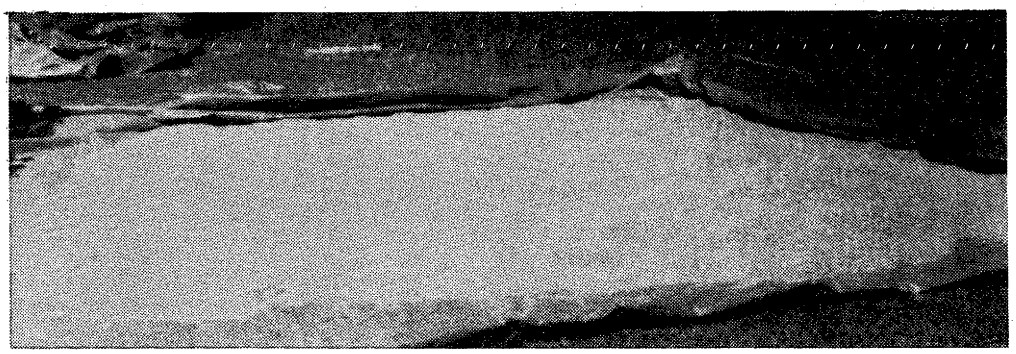
At harvest, rice usually has a moisture content of 23-25%. It is not safe to store rice until the moisture content is below 14%.

To dry your rice, spread it over a large sheet of plastic or tarpaulin, in a sunny place, in a layer 1 to 3 cm deep. The drying will take 3 days under full sun, if the rice is stirred regularly. Allow more time if the weather is wet or overcast.

To check if your rice is dry enough to store, bite one of the grains in your teeth. If it snaps with a sharp sound, then the rice is dry. Check grains from different parts of the pile.



A threshing frame



Threshed rice spread out in the sun for drying

WINNOWING

Winnowing is done by throwing the rice into the air and letting it fall in the wind so that the light straw, dust and empty grains are blown away. Big pieces of straw should be removed by hand. After winnowing the rice should be clean.

BAGGING

Store rice in clean jute bags. Pour the rice into the bags and shake to let the grains settle. If only 2-3 bags are produced, the rice can be processed on the farm. If more bags are produced, it is best to take them to a rice mill for processing into white rice. Paddy rice (unprocessed rice) is bought by D.P.I. at 13 toea/kg, whilst the milled rice is bought at 30-40 toea/kg.

RICE MILLING

Rice milling is the process of separating the husk and bran from the paddy rice to get white rice. The husk and bran form layers over the white rice grain.

Equipment for milling rice varies from simple pestles and mortars to foot and wind-mills, to modern rice mills which use a fuel generator. A pestle and mortar will produce 10-15 kg per day of polished rice.

A foot mill will produce 100-150 kg per day. Modern rice mills will produce about 1200-1600 kg in a day. Usually small farmers use pestles and mortars, while the modern mills are owned by D.P.I. or a farmers' association.

FURTHER READING

De Datta, S.K. (1981). *Principles and Practices of Rice Production*. International Rice Research Institute. John Wiley & Sons, Inc., USA.

Bubia Information Bulletin No. 41 (1982). Newly developed high yielding the variety 'Senis'.

International Rice Research Institute (1975). *Major Research in Upland Rice*. Los Banos, Philippines.

McAlpine, J.R. and Keig, G., with Falls, R. (1983). *Climate of Papua New Guinea*. CSIRO, Canberra.

Sands, D.P.A. (1977). The biology and ecology of *Leptocorisa* (Hemiptera: Alydidae) in Papua New Guinea. *Research Bulletin* No. 18. D.P.I., Port Moresby.

Tomlinson, D. (1983). Rice blast. Plant Pathology Note No. 25. *Harvest* 10 (2): 87-89.