

Guli Ragi Method of cultivation

Farmers have continuously practiced need based location specific research on their farms to satisfy the diverse needs of their family. Guli method has been a best example for farmer's wide knowledge in cultivation methods. Despite resorting to high yielding varieties and application of fertilizers and chemicals, the farmers get at the most 15 quintals of finger millet (ragi) grain yield per acre. But the farmers from around Haveri District, Karnataka, India, practice a unique method of cultivating ragi called as GULI VIDHANA – square planting. The experienced farmers from Haveri district have designed and developed simple steps that can be adopted by any one who desires to follow Guli Vidhana of ragi cultivation and can be adopted in any other place. By following this method they harvest around 18-20 quintals of ragi per acre. Guli Vidhana is simple and similar to SRI popularly known as Madagascar method of cultivation.

Even when High yielding varieties are sown and chemical fertilizers are applied to the crop, the yield is not more than 15 quintals per acre. But in guli method (square method of finger millet transplanting), just 1kg of local variety seeds are sown and the yield per acre was observed to be 18 to 20 quintals.

Comparison between Different Ragi cultivation methods

Conventional method	Guli ragi method
10 kg /acre Ragi seeds require for sowing	1kg/acre Ragi seeds is enough
Yield about 8 to 10 quintal/acre	Yield about 18 to 20 quintals/acre
3/4 feet difference in the rows	1 1/2 feet difference between the rows
Disease attack more	Less attack of disease
(Koorige) Seedril sowing	Transplanting
5 cartload of grass for every acre	8 to 10 cartload of grass
More usage of chemicals	Use of organic manure only
Tillering 4 to 6 and less no of ear heads	40 to 80 tillers and more no of ear heads
Mono crop	Horse gram can be grown
No usage of koradu for leveling the land	Usage of koradu (leveler)
	Good quality of seed selected for sowing

Tillering and earheads are more in Guli method due to its wider spacing of 11/2 feet from plant to plant with two saplings per hill. Koradu is used after a week wherein it helps to improve the size of and quality of the ear heads.

NORMAN UPHOFF Report on Guli Ragi

Chinnikatti village in Haveri district, farmers here cultivate ragi (finger millet) in a very innovative – and productive – way. This course grain is the staple food for millions of Indian households, especially poor ones. It is grown as a rainfed crop, enhanced with supplementary irrigation where possible. Yields are usually in the range of 5-10 quintals per acre (1.25-2.5 tons/ha). A yield of 15 quintals is considered a very good yield (3.75 tons/ha).

The cultivation system practiced here in Chinnikatti, called guli ragi, has many resemblances to SRI for rice. It achieves yields of 18-20 quintals per acre (4.5-5 t/ha) and as much as 25 quintals per acre (6.25 t/ha) without use of chemical fertilizers. Also, 20 to 25 cartloads of ragi fodder are also

produced per hectare which is valuable for animal production. After the Green Foundation learned of this system ten years ago, it began trying to promote guli ragi elsewhere. On the poster that it produced to describe guli ragi, the similarities with SRI are noted.

Farmers clear their field as usual for crop production, and then they create a grid similar to that with SRI. Furrows 18 inches (45 cm) apart are incised on the soil using a simple ox-drawn plow, pulled across the field in perpendicular directions. Then young seedlings, 20-25 days old (never more than 30 days old), are planted, 2 each at each intersection. Note that the word guli means intersection or node, so guli ragi is 'intersection millet,' implying widely-spaced millet.

The most innovative part of guli ragi is what is done to the growing crop. While the young plants are still supple, between 15 and 45 days after transplanting, when their stems will not break when bent over, farmers draw a simple ox-drawn implement -- a wooden implement called a koradu -- across the field in different directions. Bending the plants over traumatizes their stems at ground level, where root and shoot meet and where the plants' meristematic tissue which produces new tillers and roots is located. Dragging a koradu across the field 3 and 6 times during this period of early plant growth (during the third to sixth week) stimulates profuse growth of adventitious roots and also much more tillering above-ground.

The koradu is essentially a hollowed-out log, about 6-7 feet long and 15-18 inches wide, attached by ropes to the yoke of a team of oxen. A farmer stands on the koradu to add weight to it as he guides the team and the koradu over the field. Farmers showed me with pleasure the system of sticks and ropes that enables them to steer the oxen while riding on the koradu.

When other growing conditions are favorable, a single guli ragi plant will have 25-30 tillers, with heads that are considered 'fisty,' meaning tight and full. The larger root system enables the panicles to be larger and better filled with grains. In SRI, we treat the young seedlings with the utmost gentleness and care; however, young guli ragi plants are 'abused' to achieve the same result -- larger root systems and more productive canopies.

The first thing we did in the village itself was to visit the village seed bank that AME has helped establish, with a huge variety of different seeds from dozens of local varieties of different crops. The somewhat elderly woman who serves as manager of the seedbank proudly showed us the biodiversity being husbanded and was pleased to have pictures taken of the facility.

The village temple, where we held our discussions, had a large covered veranda fairly freshly decorated with colorful paintings of deities. I was told that this is the usual place for meetings in the village. To begin the meeting, one farmer stood and sang a prayer, a song in praise of ragi, Krishna told me. The panchayat leader then greeted us, and we talked about guli ragi so that I could understand better its details. The farmers commented that at first the seedlings look "very sparse," just as is said of SRI rice transplants. But they fill dramatically in the field once their growth accelerates.

There was no agreement on how old the system is. Some thought it was developed 25-30 years ago, but others said it was much older. The traditional method of ragi cultivation, still used in most villages, is to sow ragi seeds with the first rains. An improvement upon this is to broadcast seeds together with farmyard manure (FYM).

The introduction of sowing in lines to permit intercultivation (weeding) between rows was an innovation that probably came with colonial agricultural extension. However, it was not clear when transplanting in a square pattern was started, rather than rows, permitting intercultivation in perpendicular directions. Transplanting of ragi was prompted by good experience with putting young ragi seedlings in between rows of maize or cotton. Guli ragi requires more input of labor, they acknowledged, but the returns are several times higher than with conventional cultivation.

During our discussion, I suggested to the farmers that they experiment with transplanting of younger seedlings. Researchers at the Andhra Pradesh agricultural university (ANGRAU) have shown that, at 60 days of age, the roots of ragi plants that were transplanted as 10- or 15-day-old seedlings become much larger than those of seedlings transplanted when 21 days old. The picture that I showed farmers on my laptop screen was quite convincing, and many expressed willingness to try using very young seedlings.

We drove to some fields outside the village and then walked past a conventionally-managed field of ragi with a hybrid variety recommended for the area. The advantages of guli ragi using a traditional variety were immediately evident. There was no lodging in the latter, whereas there was much lodging of the fertilized hybrid field. Also the guli ragi grains were ripening synchronously, something seen also with SRI, whereas the conventional ragi was maturing unevenly. The farmers said that stem borer problems are less when they use the koradu, and so are aphids. The crop had not filled the field as much as I expected, so I asked whether they it might not be a good idea to try somewhat narrower spacing. Farmers said that what I was seeing was an effect of this year's drought. Normally the field would be well covered by now, they said, with a closed canopy. This year, they had been only able to do one koradu pass over the field during the first 45 days, so this was not a good example of the method.

I asked again, to be sure, when and where guli ragi cultivation had started, and they said it started here in **Chinnikatti**, and had spread over most of three neighboring taluks (subdistricts). We visited some other fields nearer to the village, and in one area, seven different ragi varieties were being grown. One (Salemsana) was particularly beautiful, bolt upright with brownish colored grains. This was direct seeded and has very good cooking qualities, farmers said. I told them that in the U.S., I eat millet 5-6 times a week, in the breakfast cereal that my wife prepares. Millet is increasingly appreciated as a health food in America.

Back at the temple, we resumed the discussion. They demonstrated another implement, the yedekunte, which is used for intercultivation. I had though this meant just weeding, but it clearly includes what I call active soil aeration. The long handle of the yedekunte is connected by a rope to an ox-yoke, and it is steered by a farmer walking behind. The implement being demonstrated was about 4 inches (10 cm) wide, with a blade of this width that digs about 3 inches (7.5 cm) underground. It is similar in some ways to what gardeners call a 'stirrup hoe.' It cuts off the roots of any plants (weeds) at that depth and also turns up this depth of soil, aerating it in the process. The implement can be made wider and able to plow more deeply. That this prunes some of the roots of the ragi plants growing in rows on either side is not considered a problem. One farmer said, 'My father always told me: if you break one root, you get ten more.'

For guli ragi cultivation, the yedekunte is pulled through the field between plant rows 5 or 6 times during the growing season -- "as much as possible," someone said -- starting from 15 days after transplanting. One of the reasons for guli ragi success, I am sure, is the active soil aeration it achieves, especially when used in perpendicular directions with square-planted seedlings. I

congratulated the farmers on having such a 'modern' implement since active soil aeration is now being better understood through scientific studies to know how and why it contributes to better crop performance.

As the sun began setting, we said farewell and drove back into Haveli, where we had a leisurely supper at the hotel and got to the railway station by 11 for a scheduled 11:30 departure, taking the overnight sleeper train. Unfortunately, it did not come until 1:15, so we got back to Bangalore only at 8:30, not much before the SRI forum scheduled for 10:30 Tuesday morning.