CULTURE OF RICE IN CENTRAL OKLAHOMA FOR DOMESTIC USE

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Since 1975, rice has been harvested annually from a small irrigated plot in McClain County, Oklahoma. Cultural practice is detailed and analyses of soil and irrigation water are presented. Yield in 1979 compared favorably with the U.S. national average for commercial production. The methods used seem appropriate for providing healthful rice in quantities desired by farm families which grow it.

INTRODUCTION

Production of rice (*Oryza sativa*) in the United States from 1975 to 1978 has been at the average rate of nearly 5.5 billion kg annually from nearly 1.1 million hectares. The characteristics and culture of this essential crop in warm humid regions around the world is described in some detail by Leonard and Martin (1). Important amounts are grown in Arkansas and California, at the same latitude as central Oklahoma.

My paddy, shown in Fig. 1, is an oval, 5½ × 18 meters along the major axes, as measured at the end of the 1979 growing season. The elliptical area is thus 78 m^2, 1/128 hectare, or 1/52 acre. Water stands in this plot after heavy rains and it is thus unsuited to culture of common garden crops. The background leading to my practice has been presented elsewhere (2).

I began rice culture in 1975, with fallow periods during the nearly 8 months between rice harvesting and planting. Preparation of seed for planting involves placing approximately 1 kg of rough rice held from the previous harvest, in a plastic bag or other container. The container is filled with water to wet the rice, then the excess water is poured out and the container covered to prevent further evaporation. The container with wet seed is placed in a warm environment, e.g., on an insulated domestic hot water heater, in order to stimulate germination. Typically, germination takes place in about three days; seed should be ready for planting within a two-week period centered about May 10th. I sow the germinated seed by hand by gently distributing it as evenly as practical over the freshly levelled and cultivated paddy, then I rake the paddy lightly to hide the seed from birds.* The paddy is then flooded and maintained with standing water thereafter until two weeks before harvest. This practice involving sprouted rice gives the cultivar a helpful head start over weeds.

During the four seasons 1975-1978, I applied approximately 100 kg of bovine manure before planting and none or little thereafter. With improved leveling of the paddy and other minor variations in practice, there was a larger yield each year than the year before, with 34 kg of rough rice harvested in 1978 from an area of about 70m^2. During 1979, I did not apply bovine manure before planting, but rather about 10-15 kg of well-granulated, year-old chicken manure. Thereafter, I reapplied about 10 kg of chicken manure every time the rice leaves showed signs of yellowing. Approximately 50 kg of pulverized chicken manure was so applied through the 1979 sea-

FIGURE 1. Rice paddy in McClain County, Oklahoma, 0.0078 hectare, August, 1979.

*Effective cultivation with a small disc plow and rototiller, which minimally disturbs the level of the land, has depended on burning the stubble of the previous year's crop. Rice straw is very tough and decomposes rather slowly. A use for the straw might be found among basketmakers.

son and the 1979 rice harvest from the 78-m^2 plot amounted to 43 kilograms, (Fig. 2).

In preparation for harvest, the irrigation water is shut off September 1-5, and the paddy is allowed to dry. Sometime during the period September 15-20 the panicles are gathered together by hand and cut off with a knife. This procedure has occupied about 3 hours. The stalks and panicles are allowed to dry for several weeks or longer in a large wooden tray and other containers protected from birds. Threshing occupies about an hour and is accomplished by moving the panicles and short stalks to a suitable tray or canvas dropcloth, and striking them repeatedly with the flat side of a pitchfork. This dislodges most of the grain, which falls to the bottom of the mass. The stalks with a few remaining rice kernels, not more than 2% of the total, are thrown to chickens and ducks, which relish the grain. My 1979 harvest of 43 kg of rough rice after threshing corresponds to a yield of about 5500 kg/hectare, or 4900 pounds per acre. This may be related, with some corrections for effects of borders, to current U.S. average commercial production of about 5080 kg/hectare.

I hull the rice a kilogram at a time because rough rice has kept well for two years in my barn without special treatment, while the hulled rice usually shows some signs of insect damage after about 60 days, and sometimes before then, unless refrigerated. I use a small hand-operated huller ("Java") purchased from J. D. Gordon Company, Ltd., Epping, Essex, England.

My paddy of Pulaski Port soil is located in McClain County in Section 21, T6N, R3W. The soil is deep, well-drained, and moderately permeable with a high water capacity. Higher permeability implies a larger water requirement to offset infiltration; I estimate that 2 meters of water, perhaps even more, is applied by irrigation to my paddy through the season. Soil samples were taken from various depths at the end of the 1979 growing season; a description of each and a chemical analysis of the surface sample is presented in Table 1. The low nitrate content is characteristic of rice soils at the end of the growing season.

FIGURE 2. Rice near maturity, McClain County, Oklahoma, September, 1979.

TABLE 1. *Description and composition of Pulaski-Port soil*[a] *from McClain County, S21, T6N. R3 W, near Finn Creek*

Depth	Description[b]
Surface	Very dark brown silt loam; moderate, very fine granular structure; slightly hard when dry, friable when moist.
27 cm.	Dark brown loam; moderate, fine granular structure; slightly hard when dry; friable when moist.
53 cm.	Reddish brown, silty clay loam; moderate, medium and coarse granular structure; very hard when dry; firm when moist.
80 cm.	Reddish brown, heavy silty clay loam; weak medium subangular blocky structure; very hard when dry, very firm when moist.

Results of chemical analysis[c] of surface sample

Factor	Parts per million
Nitrogen (NO_3^-):	12
Phosphorus	172
Potassium	120
pH 6.7	

[a]Samples taken 8 October, 1979 after five rice crops in successive years 1975-1979.

[b]Provided by Mr. Robert Boulier, Soil Scientist, Soil Conservation Service, Cleveland County, Oklahoma, 73069.

[c]Provided by the Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma 74078.

Essential irrigation of the rice is provided by Finn Creek and an electric pump. Water is maintained continuously at a depth of one to five cm during the growing season. Results of analysis at the Oklahoma City Water Department, based on a water sample taken during May 1976, are listed in Table 2. The sodium content of

38 ppm is far below the levels at which it may inhibit rice development. I estimate that 50 kwh of electric power are consumed through the season for irrigation.

Three weeds are conspicuous in the paddy. Barnyard grass (*Echinochloa*) invariably appears as scattered plants which are easily removed when they (and the rice) are only 1"-3" tall. For this purpose I stand on a 2" × 10" board laid at intervals across the paddy. The board pressing on the young rice plants for a short period does them no serious or permanent damage. Young *Echinochloa* plants resemble rice superficially but they are distinguished easily from rice on close inspection because the base of *Echinochloa* stems has a red or pink cast, while the base of rice culms is nearly white. Also barnyard grass leaves are deeper green than rice and their ligules are smooth and less conspicuous than the rice ligule, which is pubescent. One weeding about three weeks after planting is generally adequate for the barnyard grass, although a few specimens are invariably missed and show themselves late in the season. A few smartweed (*Polygonum*) plants also always appear, but they are easily identified and removed. The most serious invader is toothcup (*Ammannia*) which emerges as thick as grass shortly after the rice. *Ammannia* definitely impedes the rice, but it matures early in the season at 6-12-inch height and is thereafter overshadowed. Practical control is effected by the fertilization which causes the rice to grow faster both relatively and absolutely. *Ammannia is* also somewhat controlled by increasing the water level in the paddy. No herbicides have been used for weed control.

TABLE 2. *Composition of water*[a] *from Finn Creek in McClain County, S21, T6N, R3W*

	Parts per million
Total Alkalinity[b]	262
Non-Carbonate Hardness[b]	11
Total Hardness[b]	273
Calcium	36
Magnesium	46
Chlorides	24
Carbonates	0
Bicarbonates	262
Nitrates	Less than 5
Sulfates	21
Sodium	38
Potassium	0.7
pH 7.8	

[a]Sample taken during moderately low flow, 11 May 1976. Analysis made at the Oklahoma City Water Dept.

[b]Calculated as calcium carbonate, $CaCO_3$

Loss of rice to birds has been negligible though sorghum planted in the same area has suffered heavily from that cause. The flexible rice stalk does not seem to provide a satisfactory perch. Grasshoppers do eat the grain, but it seems not to be very attractive to them, and losses that occur without controls are estimated at less than 1%. No other significant insect pests have been observed to damage the rice, although they abound elsewhere in close proximity.

My rice variety has been Nova 66, a medium-grain variety, now considered obsolete because of its increasing susceptibility to blast, a fungus disease. Though blast has affected less than 1% of the rice stalks in my paddy, and other diseases have not been apparent, I am planning to try the long-grain variety Lebonnet in 1980.

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