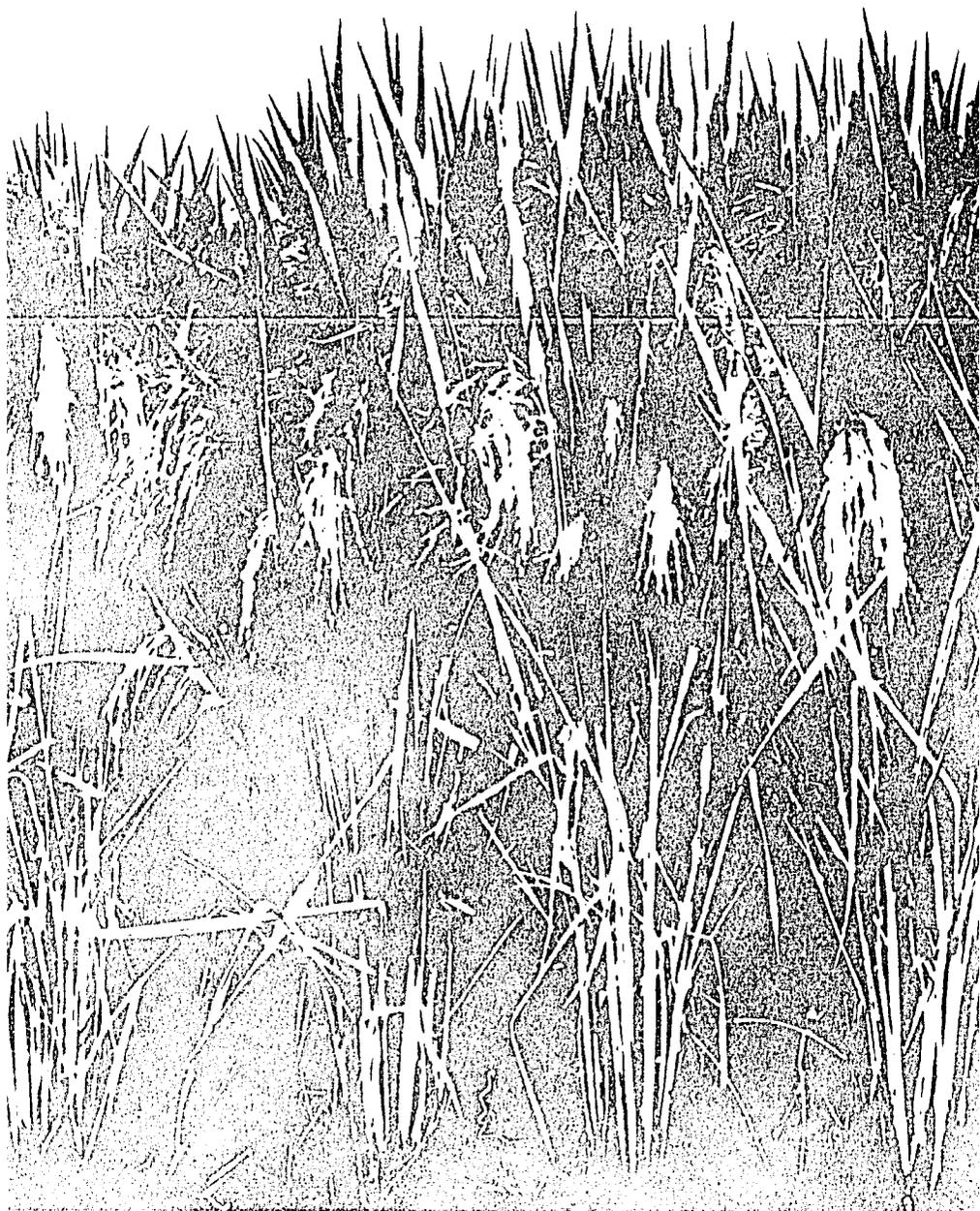


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TROPICAL RICE GROWER'S HANDBOOK

# planting rice

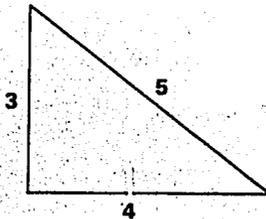


THE INTERNATIONAL RICE RESEARCH INSTITUTE

## CHANGES

Page 3. Section "Establish the first base line." Second sentence should read: Preferably make the first base line parallel to one of the border levees *on the long side of the plot.*

Page 4. The correct proportions of the diagram are given below:



Page 6. Section "Replace missing hills" should read: Ten days after transplanting, replant all missing hills with extra seedlings previously saved.

Page 7. Section "Prepare the soil." (Upper half of page.) First sentence should read: The soil must be well puddled, *well fertilized, and well levelled.*

Page 8. Section "Prepare the soil." First sentence should read: Soil must be well puddled, *well fertilized, and well levelled.*

# Planting rice

## THE PLANTING WIRE AND BOARD

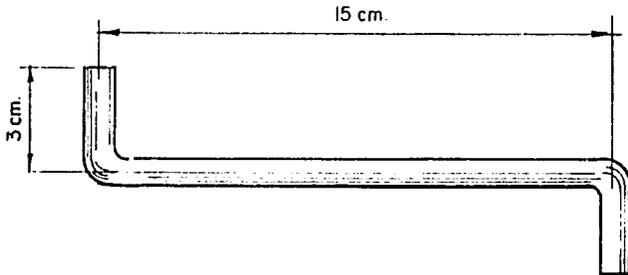
Transplanting in straight rows permits good crop management throughout the growing season because workers can weed or spray without stepping on the plants. One method of straight-row planting involves the use of the planting wire and board. You'll need:

- 1 wooden board, 5 × 15 × 200 cm**
- 2 wooden boards, 2 × 5 × 200 cm**
- 50 nails, each 5 cm long**
- meter stick or any other measuring device**
- iron bar, 8 mm in diameter, both ends bent at a right angle to the bar (fig. 1)**
- iron wire, type No. 18 (about 2 mm in diameter), 20 m long**

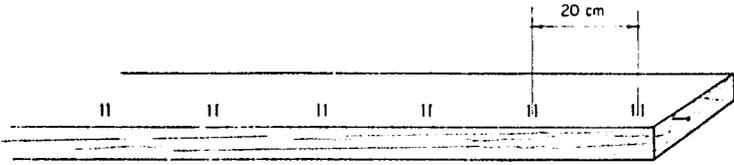
### *Making a planting wire*

#### **Mark spacings on the board**

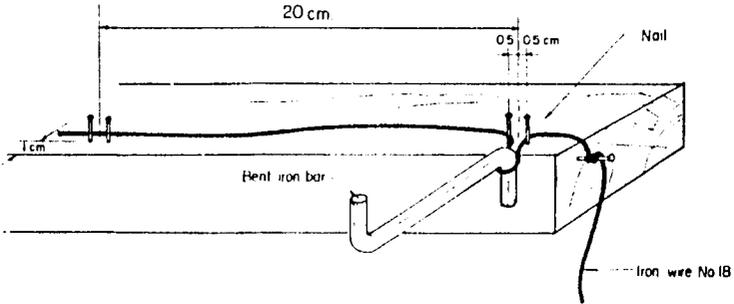
Use a board, 5 × 15 × 200 cm. With a pencil, mark off the spacing desired, using a steel tape or meter stick as a guide (for example, for spacing of 20 × 20 cm, mark off 20-cm intervals). Hammer a nail on each side of each mark, 0.5 cm from the mark and 1 cm from the side of the plank (fig. 2 and 3).



**1.** Iron bar used for preparing the planting wire



2. Board with nails used in making a planting wire for a spacing of 20 × 20 cm



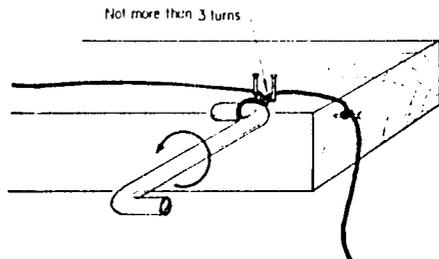
3. The first step in making a wire loop is to insert the iron bar between the iron wire and the nails

### Mark spacings on the planting wire

Hammer a nail in one end of the plank and tie one end of the No. 18 wire to it. With the bent iron bar held at the side nearest the first pair of nails, pass the wire between them and over the iron bar, then back between the nails (fig. 3).

Twist the wire by turning the bar three times while *slightly* stretching the wire. *Do not stretch too tightly or turn the bar more than three times.* The result is a loop (fig. 4). Continue with the next loop and so on until you have a practical length of the planting wire.

*Alternative procedure:* Many workers have found that nylon cord (about 2 mm in diameter) can be used. Strips of rubber (about 2 cm wide) are attached to the nylon cord to



4. Forming a loop in the iron wire

mark the spacing. After washing, the material is like new, and can be used repeatedly.

### *Making a planting board*

#### **Mark spacings on the board**

Use a board about 2 × 5 × 200 cm. Using a steel tape or meter stick as a guide, put a pencil mark at the spacing desired.

#### **Drive nails at the marks**

Hammer a nail into each pencil mark. Check the spacings after all nails are driven by rereasuring the distance between every two-nails.

## LAYING OUT EXPERIMENTAL PLOTS

Meaningful results from farm trials depend partly on an exact plot layout. A proper plot layout facilitates both transplanting in straight rows and the construction of levees required by the planting plan. You'll need:

steel measuring tape, 20 meters or longer

40 bamboo stakes

50 meters of abaca twine

### **Study the plan of planting**

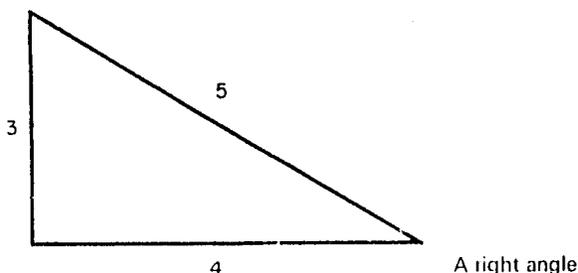
Carefully note the size of the entire area, the length, width, and number of treatments or replications.

### **Establish the first base line**

Stake two points and tie abaca twine between them. Preferably make the first base line parallel to one of the border levees. Retain this line for transplanting. The distance between the levees and the base line will depend upon the purpose of the planting.

### **Establish the second base line**

Stake two other points and stretch abaca twine so that it is perpendicular to the first line. Right angles between the two base lines may be established by using a notebook or applying the Pythagorean equation:  $3^2 + 4^2 = 5^2$ . Retain this line for transplanting. The distance between the levees and the base line varies depending upon the purpose of the planting.



### **Measure the sides of the entire plot**

First measure the length and width along the established base lines. Mark with stakes. Then stake the fourth corner by measuring out the same length and width.

### **Measure the individual plots**

Measure the sides of treatment plots, alleyways, and replications. Mark them with stakes. Do this on opposite lengths and widths. Connect corresponding stakes with string.

## TRANSPLANTING

Transplanting in straight rows allows weeding in two directions with a rotary weeder or by hand. And laborers can move through the field to apply fertilizer or insecticides without destroying plants. In addition, uniformly spaced plants grow more evenly. The disadvantages of transplanting, compared with direct seeding, are high labor costs and the time seedlings take to recover after transplanting, which delays harvest from a week to 10 days.

Transplanting should be done after the land has been thoroughly plowed, harrowed, and properly fertilized, and the excess water has been drained off. You'll need:

- 1 planting wire, long enough to cross the paddy being planted**
- 2 planting boards, each 2 m long**
- 2 bamboo poles, each about 2 m long**
- seedlings**

### **Place the planting wire**

Stretch the wire along the first base line (see "Laying out experimental plots"). Push a bamboo pole into the ground

at each end of the first base line. Tie each end of the wire to a bamboo pole so that the wire is about 10 cm above the soil.

### **Place the planting board**

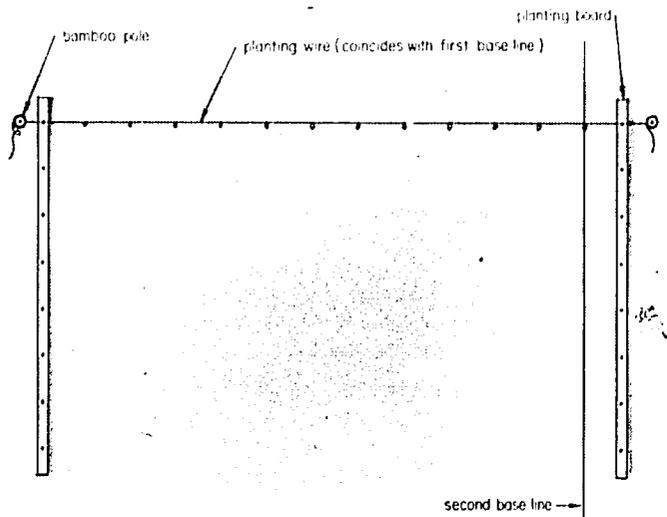
Place one planting board along the second base line (see "Laying out experimental plots") so that the first marking on the board coincides with the first base line (fig. 5). Place the second planting board opposite the first one. Its first marking should coincide with the first base line.

### **Distribute seedling bundles throughout the plot**

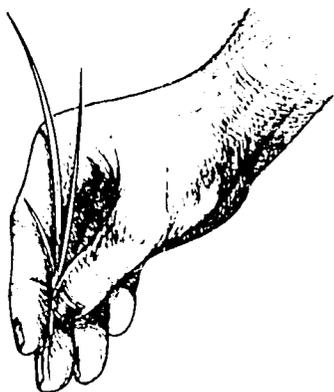
### **Position the transplanters along the planting wire**

### **Plant the seedlings**

Hold the seedling bundle in a way that makes it easy to detach the seedlings. Detach the proper number of seedlings from the bundle, protecting the roots by keeping them in three fingers (fig. 6) while inserting them into the soil right under a loop on the planting wire. Plant no shallower than 1.5 cm, but no deeper than 3 cm. Make sure the planting wire is stretched while you are planting. When the first row has been planted, lift the planting wire and move it to the next row using the next mark on each of the planting boards as the end points of a new row. Move backwards to plant subsequent rows.



5. Birds-eye view of set-up of the planting wire and boards before transplanting



6. Holding a rice seedling for planting

### **Save extra seedlings**

Collect all extra seedlings and plant them in one bundle for later use in replanting.

### **Clean up**

When the last row has been planted, remove planting wire, boards, and base lines and clean them thoroughly.

### **Maintain shallow water level**

After transplanting keep water about 1 cm deep for 3 to 4 days until the plants recover. Then increase the depth to 5 cm.

### **Replace missing hills**

Ten days after transplanting, replant all missing hills with extra seedlings previously saved or with tillers from neighboring hills.

## **DIRECT SEEDING**

Direct seeding greatly reduces the labor cost for establishing a stand of rice. But it requires more seeds than transplanting—50 to 100 kg/ha depending on method. Low-tillering varieties require higher seeding rates than high-tillering varieties.

Direct seeding requires much better control of irrigation and drainage than transplanting. Newly germinated seedlings will die within a few days if the soil surface dries out or if they are completely covered with water.

### **Broadcasting on puddled soil**

Broadcast seedlings develop rapidly. The newly sown seeds are, however, exposed to damage by rats, birds, and unexpected heavy rainfall. Herbicides are essential for good weed control. You'll need:

**pregerminated seeds (soaked 24 hours and incubated for at least 24 hours)**

### **Prepare the soil**

The soil must be well puddled. Make canals around the plot for drainage if rain falls right after seeding. Drain all excess water from the field before broadcasting.

### **Broadcast the seeds**

Use pregerminated seeds.

### **Irrigate the field**

Do not irrigate immediately after seeding. Five days after seeding, gradually let water in the paddy and, as the seedlings grow, increase the water depth to 5 cm.

### *Drilling in granulated soil*

Drilling in granulated soil requires less water than drilling in puddled soil, but seedlings develop more slowly in the early stages. You'll need:

**grain drill  
dry seeds**

### **Prepare the soil**

Do this only when soil is dry. Plow and harrow until big clods are pulverized. Make shallow furrows, 10 to 15 cm deep and about 1 meter apart, to facilitate irrigation. Do not irrigate before seeding.

### **Sow the seeds**

With a grain drill, drill the seeds (which have not been pregerminated) 2 to 4 cm below the soil surface.

### **Irrigate the field**

After drilling, let the water enter the field through furrows. Do not flood the field.

### **Flood the field**

Three to four weeks after seeding, flood the field continuously with water if available.

### *Drilling in puddled soil*

Compared with the broadcast method, an advantage of drilling is that weeding by rotary weeder is possible. A drawback is that seeds not covered by mud are exposed to bird and rat damage. You'll need:

- pregerminated seeds (soaked 36 hours and incubated 36 hours)**
- an IRRI six-row or eight-row seeder.**

### **Prepare the soil**

Soil must be well puddled. Make canals around the field for drainage in case rain falls right after seeding. Drain all excess water from the field before drilling.

### **Sow the seeds**

With the six-row or eight-row seeder developed by IRRI (fig. 7), drill pregerminated seeds. Seeds will stick to the



7. IRRI seeder for pregerminated seeds

bottom of the furrow opened by the seeder if the soil is well puddled and the water is drained just before seeding. Do not flood the field right after seeding.

### **Irrigate the field**

Starting 2 days after seeding, gradually raise the water level in the field to about 1 cm below the tips of most seedlings until the water is 5 cm deep.

### *Pregerminating the seeds*

You need pregerminated seeds for broadcasting or for drilling in puddled soil with the IRRRI seeder. Start with good quality seeds that have at least 80 percent germination. Half fill a burlap (jute) sack with the seeds. Soak the seeds, in the sack, in water for 24 to 48 hours at room temperature, then rinse them with fresh water. After rinsing wrap the sack of seeds in two or three layers of thick dry canvas or in another moist burlap sack. Keep the wrapped sack on a dry, shady floor for 24 to 36 hours. The seeds are suitable for planting from the time that the seedcoats have just broken until the sprouts are 1 cm long.

### *Transplanting specifications*

*Spacing.* For modern high-tillering varieties, 20 × 20 cm is a convenient plant spacing. Spacings of 10 × 10 cm use more seed and require more labor. Spacings of 40 × 40 cm or more rarely yield well.

*Seedlings per hill.* With modern high-tillering varieties, two or three seedlings per hill are adequate. With dapog seedlings it may be difficult to avoid planting more than two or three seedlings per hill.

*Depth of transplanting.* Plant seedlings 1.5 to 3 cm deep. If seedlings are planted deeper, the old roots suffer and new roots develop from a node close to the soil surface. This may delay the normal absorption of nutrients from the soil, thus delaying the recovery of the seedling and the onset of tillering. Seedlings planted too shallow will not be firmly held erect by the soil especially when the wind is strong.

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