field trial was in a split-plot design with four replications. Two kg bentazon/ha was applied alone and in combination with 1.0 kg amine salt of 2,4-D/ha as a directed spray 15 d after rice germinated.

Weed flora in the experimental field was 60-70% annual sedges (Cyperus iria L., C. diffomis L., Fimbristylis miliacea (L) Vahl, Scirpus acutus Muhl), 15-20% annual broadleaf weeds (Aeschynomene indica Linn, Ludwigia parviflora Rosb., Cyanotis cucullata Kunth, Monochoria

vaginalis Presl), and 10-15% annual grasses (Echinochloa crus-galli (L) Beauv., Eragrostis cilianensis (L) Beauv.).

Bentazon treatments did not damage any rice but IR36. Parts of IR36 leaves turned yellow-brown the day after bentazon treatment, but the discoloration disappeared 5-7 d later.

Weed control efficiency was assessed 60 and 90 d after sowing. Bentazon + 2,4-D controlled weeds in T141 and Mahsuri significantly better than in IR36,

perhaps because T141 and Mahsuri form a thicker canopy more quickly than semi-dwarf IR36. Weed weight differed for different rice varieties, but interaction between herbicide treatment and variety was not significant.

Bentazon + 2,4-D gave significantly higher grain yield in T141 over hand weeding and bentazon alone (see table). Results with bentazon would be different if grasses were the predominant weed species. □

Machinery development and testing

Husk-fired rice parboiling unit developed

S. Thangavelu, M. Ramanathan, and P. Vasudevan, Tamil Nadu Agricultural University Research Centre, Vellore, India

We developed a husk-fired, 0.5-t capacity rice parboiling unit that is suitable for use by farmers and small rice mills. It uses steam parboiling.

The unit consists of a 1.2- × 1.2-m galvanized iron drum that is separated horizontally into 2 chambers by perforated G. I. sheet. The lower 25-cm chamber is the hot water chamber and the upper 95-cm compartment is the steam chamber. A 7.5-cm-diam G. I. vertical pipe is at the center with lateral 2.5-cm pipes welded to it in triplets at 15-cm intervals. The unit is mounted over a husk-fired furnace constructed of country bricks and clay mortar. A 20-cm water
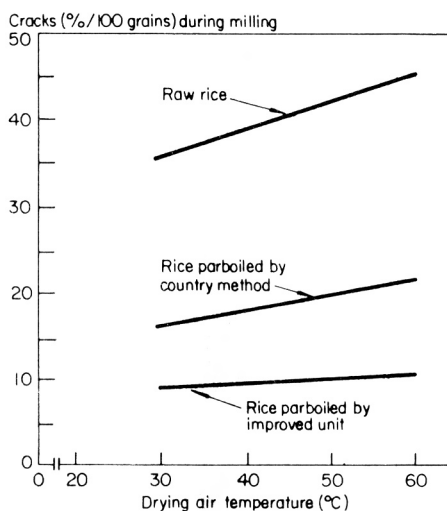
Cracks during milling of IR20 raw rice and parboiled rice.

column is maintained in the hot-water chamber and water-soaked rice is fed into the steam chamber. The unit is emptied

through the exit door.

The first batch of rice takes 25-30 min to be parboiled, and subsequent batches take 15-20 min. Traditional country parboiling takes 70-90 min/batch. With this unit, parboiling cost per tonne is 17% of that in the country method because of higher fuel utilization efficiency.

The figure compares percent breakage during milling for different parboiling methods at constant drying temperatures, but varying drying time. Using the steam parboiler, the crack percentage has been reduced to 8-12% from 40-45% for the traditional method. Bran oil content was 4-6% more than with the traditional method.

This parboiling method eliminates the dark color and undesirable smell of rice that is common with the traditional method, and eliminates development of any mycotoxins. □

Announcements

Pakistan names two IRTP entries as varieties

The Government of Pakistan recently approved rice varieties IET4094 (CR156-5021) and IR2053-261-2-3 for cultivation in Sind Province. The varieties were received from IRRI through the International Rice Testing Program and tested under local conditions for several years.

IET4094 was named Dokri Rice 82 (DR82) and is expected to replace the currently grown variety IR6. DR82 is high yielding, matures early, and has better grain quality than IR6. IR2053 was named Dokri Rice 83 (DR83). It is early maturing and is suitable for late transplanting in Aug. Until now, no variety has been available for Aug transplanting. □

New IRRI publications

The following new IRRI publications are available for purchase from the Communication and Publications Department, Division R, IRRI, P. O. Box 933, Manila, Philippines:
  Field problems of tropical rice
    (Spanish edition)
  Organic matter and rice