Philipp J. Crop Sci., 1992 17(1) 1-10

0115-463 x 92 $1.25

Lock Lodging: A New Technology for Ratoon Rice Cropping[1]

Alfredo N. Calendacion, Dennis P. Garrity and Keith T. Ingram

Agronomy, Plant Physiology and Agroecology Division,
International Rice Research Institute
Los Baños, Laguna 4031 Philippines

Ratoon cropping of rice could be an important alternative in many agroecosystems, but the practice is not common in the tropics because the yield is low. We developed a novel ratooning technique based on lodging the rice straw in a systematic braided pattern ('lock lodging') after the main crop harvest. Lock-lodging was compared with the conventional ratoon method in two experiments under different N timings and levels. In the wet season the lock-lodging technique consistently and substantially outyielded conventional ratooning (2.45 t/ha to 1.43 t/ha), with a higher harvest index (36 vs 22 percent), more profuse tillering, higher plant survival, and more synchronous maturity. In the dry season the lock-lodging technique outyielded the conventional method (3.64 t/ha to 2.82 t/ha) with less plant attrition (8.6% hill death vs. 14.8%). The lock-lodging technique reduced main crop costs by 55 percent and earned a net margin of ₱132/ha/day under pump-irrigated conditions. In gravitationally irrigated ricefields, it reduced production costs by 73 percent and earned a net margin of ₱204/ha/day. Practical methods of lock-lodging were developed for farm-scale use, indicating that the practice could be rapidly integrated into appropriate rice production systems.

Keywords: Lock-lodging, conventional ratoon, transplanted rice.

Rice ratooning in the tropics has long been an attractive concept, but it has seen only limited use by farmers. The earliest reports on ratooning in south Asia date to the early years of the 20th century (Mukherjee, 1915). Since establishment costs in wetland rice production, which include tillage and puddling, seedbed management, and transplanting, are a major investment, the potential advantages of ratooning are readily apparent. However, the low yield potential of ratooning (generally 1-2 t/ha), and asynchronous grain ripening, seem to have been the dominant factors constraining wide-scale use in the tropics. Ratooning in sub-tropical areas has been more important, and it is a major cultural system in Texas (Bollich and Turner, 1988).

There has been considerable effort to select rice cultivars for superior ratoonability (Cuevas-Perez, 1980; Prakash and Prakash, 1988). This has been accompanied by a much larger body of work that has sought to identify and manipulate the management factors that would elevate ratoon yields to economically attractive levels (IRRI, 1988). The key factors include the cutting height of the main crop straw, timing of nitrogen fertilizer application to the main crop and the ratoon, and irrigation water management. Investigations have also sought to determine the role of the straw carbohydrate content, and the main crop root growth and persistence, on ratoon performance.

Several reports indicate that cutting height did not significantly affect ratoon performance [Ishikawa (1964), Balasubramanian et al. (1970), Ramos and Dittrich (1981), Bardhan Roy and Mondal (1982)]. Calendacion and De Datta (1987) reported that a lower cutting height tended to increase grain yield but prolonged maturity. Parago (1963), Prashar (1970), Peña and Plucknett (1972) found that high cutting heights decreased ratoon grain yields.

Other studies have shown that an intermediate cutting height of 15-20 cm above ground level was optimum for ratoon rice culture [Bahar and De Datta (1977), Samson (1980), Quddus (1981), Chaterjee et al (1982), De Datta and Bernasor (1988)]. They found that a short cutting height resulted in more missing hills. Quddus and Pendleton (1983) observed that a lower cutting height slowed early ratoon growth and lengthened crop duration. Vergara et al (1988) recommended that under rainfed conditions, where water needs to be retained in the field, the main crop should be cut 15 cm or higher to minimize the number of missing hills in the ratoon crop and to reduce weed growth. Further, he hypothesized that a vigorous main

[1]Selected as one of the best paper finalists during the 22nd Annual Scientific Meeting of the Crop Science Societies of the Philippines held in conjunction with the 7th Annual Conference of the Federation of Crop Science Societies, Bureau of Soils and Water Management, Diliman, Quezon City on November 7-9, 1991.