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At ICRISAT, research was initiated on the grain legume-upland rice intercropping system with the focus on improved resource use and higher productivity by improving N availability to rice and associated crops, reducing late drought stress on rice, and increasing protein availability and cash income to farm families.
Intercropping consists of growing two crops on the same land at the same time. It can stabilize the yield from season to season, which is an important criteria in subsistence or near-subsistence agriculture. Another advantage of intercropping can be increased productivity of complementary component crops. Well-designed intercropping combines component crops that use available resources better than would single crops. While one crop is harvested early, the second continues to grow after the first is harvested, making full use of the residual resources, primarily moisture. The overall advantage of such a system is the complementary use of resources by component crops.

Given the long growing period in upland rice systems, there is a choice of two types of intercropping: temporal and spatial.

**Temporal intercropping.** Rice/pigeonpea intercropping is an example of the temporal system in which rice grows fast and pigeonpea slowly. Following the rice harvest at about 100 days, the pigeonpea continues to grow for an additional 50 to 80 days making the best use of the residual moisture and light. In studies conducted at ICRISAT using an upland rice/pigeonpea intercrop, rice gave 85-90% of the sole crop yield with pigeonpea producing 70-80% of the sole crop yield. This resulted in a land equivalent ratio (LER) between 1.54 and 1.74. In this study, intercropping was 54-74% more productive than monocropping.

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Delayed seedbed preparation and sowing of upland crops after the rice crop cause serious reduction in yield. By selecting early-maturing rice cultivars and by reducing the turnaround time, good plant stands of groundnut, pigeonpea, chickpea, and sorghum could be obtained. This system has reduced the need for irrigation water and fertilizers, and is more restorative of soil fertility. It is also more remunerative as the price of grain legumes is about 2-3 times that of rice. These studies indicate that through better soil management and use of improved varieties of grain legumes the farmer should be able to diversify RBCS.

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**Varietal development.** Varietal requirements of grain legumes in RBCS are early maturity, multiple disease and insect resistance, and drought tolerance.

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**Conclusion**

Researchers have developed photoperiod-insensitive, high-yielding, and short-duration legume varieties which can fit in rice-based systems as a sequential, intercrop, or alley crop. Careful selection of species, genotype, and efficient management will lead to the most beneficial system. Crops requiring little water and fertilizer should be introduced to minimize inputs and improve efficiency. Crop diversification is desirable for the economy of the system along with a rational utilization of resources to maintain soil health.
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