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Optimizing Greenhouse Rice Production: What Is the Best Pot Size?

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Purdue Methods:
Optimizing Greenhouse Rice Production

What is the best pot size?

Under the conditions of this study, 9-cm (4-inch) diameter square pots resulted in the greatest seed yield and panicle number as compared to 7-cm (3-inch) and 12.5-cm (5-inch) diameter pots.

Throughout the experiment the larger pots, 12.5-cm (5-inch), seemed sub-optimal. This seems counter-intuitive, as the larger pots provide more soil volume. Our best explanation is that the 4-inch pots coupled with these sub-irrigation trays had a more ideal balance of air and water in the root environment due to the pot height, volume and shape. In other words, if the 3-cm deep sub-irrigation trays that we used were either deeper or shallower, another pot size may have proven most optimum. So it is important to remember that the components of a plant growth system are not independent of each other.

The 7-cm pots (3-inch) square pots yielded seed despite a very small soil volume. We believe this is the first report of successful growth of rice in such a small container, and that this bears closer examination by research institutions involved in growing large numbers of plants, either for breeding or high-throughput screening. Grown in less-dense conditions than were provided in this study, this pot size may prove beneficial. The disadvantage would be the need for careful monitoring of irrigation to avoid water stress. Though data was not collected, our observations were that pot size did not effect the number of days required for flowering.

(*Note:* Though not included in this study, 15-cm [6-inch pots] are more stable and forgiving of water stress events if enough space is available for these larger pots. If multiple seeds are planted per pot this advantage may not be realized. A 1:1 mix may be required to wick up water in these taller pots.)

This document is based on materials originally posted to the Purdue University HLA Department Plant Growth Facility web site: http://www.hort.purdue.edu/hort/facilities/greenhouse/RiceMethod.shtml

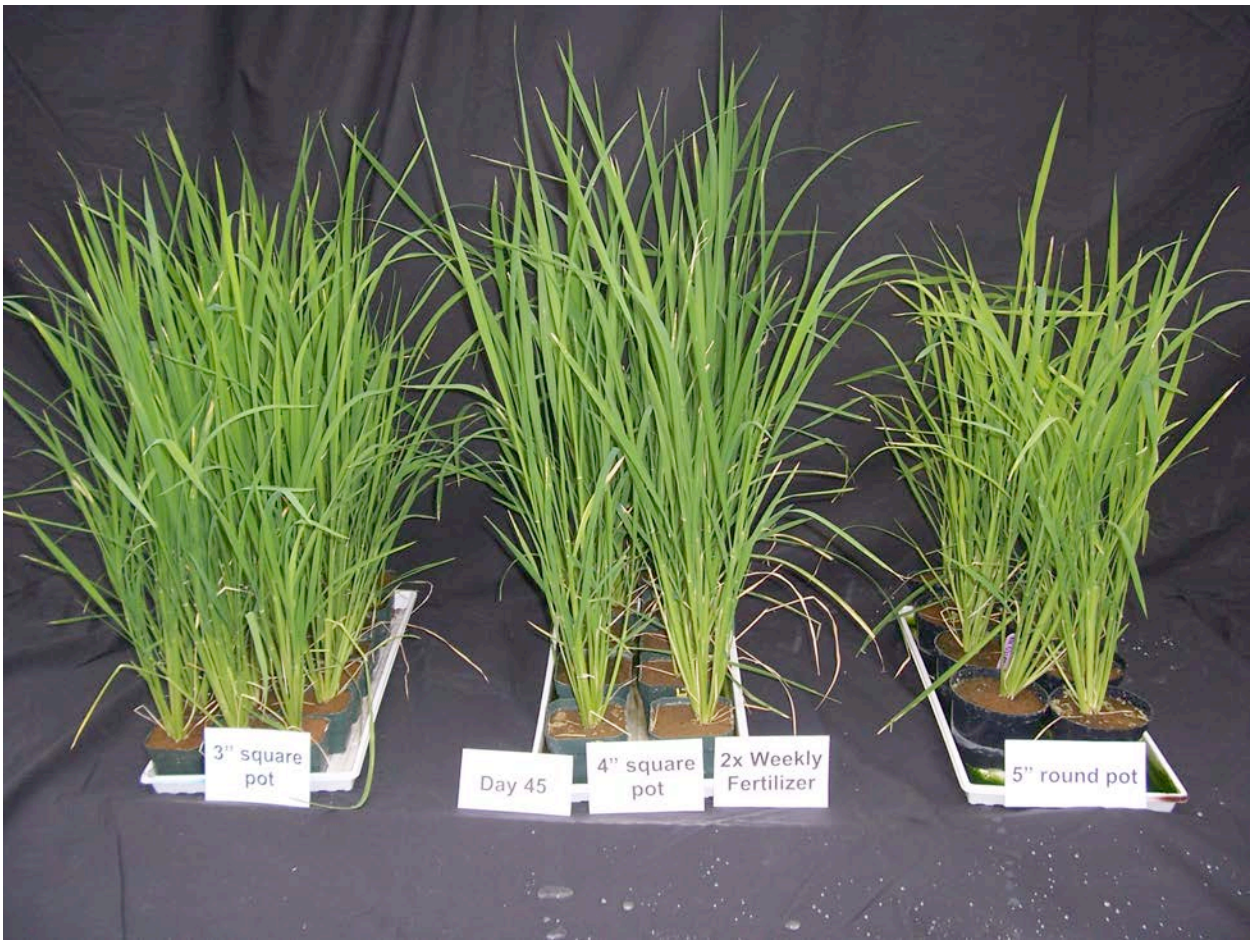

Figure 1. Rice growing in three pot sizes, from left: 7-cm, 9-cm and 12.5-cm diameter, respectively, at Day 45.

Figure 2. Rice growing in three pot sizes, from left: 7-cm, 9-cm and 12.5-cm diameter, respectively, at Day 110.

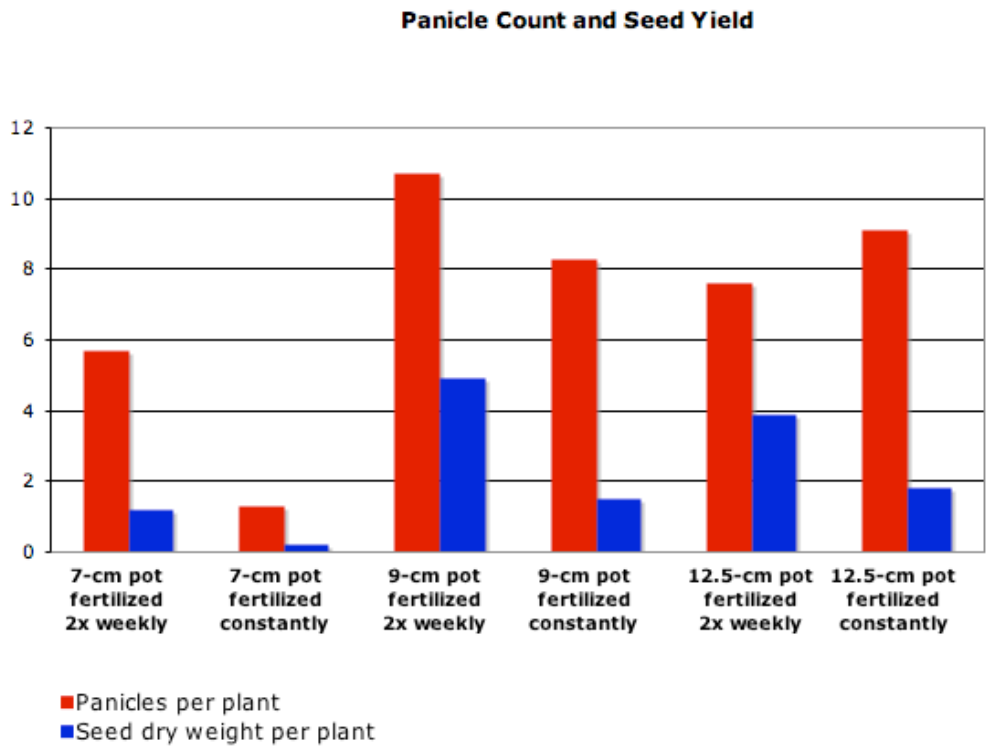

Figure 3. Rice plant panicle count and seed yield in three differing pot sizes and under two fertilization schedules.

Figure 4. Close up of rice plant grown in 7-cm pot.