Effect of Seeding Rate on Organic Rice Production

Fugen Dou

June 1, 2016
Houston, TX
Introduction

Challenges & Solutions
Objective

- Determine the optimal seeding rate on organic rice production.
Experimental Design

- **Factors**
  - Seeding rate: 108, 161, 215, 269, 323, 377, and 431 seedlings/m²
  - Variety: Presidio and XL753
  - Soil amendments: nature safe (13-0-0) 150 kg N ha⁻¹
- A randomized block design with four replications
- Seeding method: drill seeding
Table 1. ANOVA of grain yield

<table>
<thead>
<tr>
<th>Year</th>
<th>Source</th>
<th>DF</th>
<th>Pr &gt; F</th>
<th>Source</th>
<th>DF</th>
<th>Pr &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>Seeding rate</td>
<td>6</td>
<td>&lt;.0001</td>
<td>Variety</td>
<td>1</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td>Variety</td>
<td>1</td>
<td>&lt;.0001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seeding rate *</td>
<td>6</td>
<td>0.8774</td>
<td>Panicles</td>
<td>1</td>
<td>0.1358</td>
</tr>
<tr>
<td></td>
<td>Variety</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>Seeding rate</td>
<td>6</td>
<td>&lt;.0001</td>
<td></td>
<td>1</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td>Variety</td>
<td>1</td>
<td>&lt;.0001</td>
<td></td>
<td></td>
<td>0.0012</td>
</tr>
<tr>
<td></td>
<td>Seeding rate *</td>
<td>6</td>
<td>0.8262</td>
<td></td>
<td>1</td>
<td>0.9315</td>
</tr>
<tr>
<td></td>
<td>Variety</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fig. 1 Effect of seeding rate on grain yield

Rice Grain Yield (kg/ha) vs. Seeding Rate (seedling/m²)

- **XL753**
  - \( y = 4.70x + 3386.3 \)
  - \( R^2 = 0.90 \)

- **Presidio**
  - \( y = 3.8x + 1232.1 \)
  - \( R^2 = 0.90 \)
Fig. 2 Variety effect on grain yield

Grain Yield (kg/ha)

Presidio  XL753

0  1000  2000  3000  4000  5000  6000  7000

b  a
Fig. 3 Effect of variety on milling quality

![Bar chart showing the whole grain yield (%) for Presidio and XL753 varieties. Presidio has a higher yield at approximately 64%, while XL753 has a yield of around 58%.]
Fig. 4 Effect of seeding rate on rice panicles

\[ y = 3727.8x + 3E+06 \]

\[ R^2 = 0.94 \]
Fig. 5 Effect of seeding rate on the flower per panicle

\[ y = -0.052x + 114.73 \]

\[ R^2 = 0.57 \]
Fig. 6 Effect of variety on the flower per panicle

Flower per panicle

Presidio  XL753

0  20  40  60  80  100  120  140

a

b
Fig. 7 Effect of seeding rate on the grain filling per panicle

\[ y = -0.0501x + 99.901 \]

\[ R^2 = 0.5026 \]
Fig. 8 Effect of seeding rate on weeds

$y = -0.7554x + 57.616$

$R^2 = 0.72$
Fig. 9 Effect of variety on weeds
Fig. 10 Effect of variety on plant height
Increasing seeding rate linearly increased rice grain yield.
Rice yield was significantly affected by varieties.
Increasing seeding rate mainly increased panicle numbers.
Also, weed density was negatively impacted by the seeding rate.
Variety selection was important to handle weed pressure in organic rice production.
Our study indicated that appropriate variety selection plus optimal seeding rate are critical for high yielding in organic rice production.
Acknowledgement:

Kip Landry and Guangjie Liu

This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2012-51106-20137.
Thank you!