THE
GREENSEEDER
HAND PLANTER

User’s Manual, April 2014

An Implement for the Use of Small Scale Farmers

USA Edition
Developed by:
Oklahoma State University Faculty and Graduate Students

Senior Scientists:
Randy Taylor, Bill Raun, Nyle Wollenhaupt, Edgar Ascencio

Graduate Students:
Adrian Koller, Joshua Ringer, Eric Lam, Peter Omara, Sulochana Dhital, Ethan Wyatt, Natasha Macnack, Jeremiah Mullock, Bee Chim, Candi Byani, Max Metcalf, Wayne Kiner

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An Appeal for the World

Corn (also known as maize) in the developing world is planted by hand (as seen in the picture to the right, of a producer planting in El Salvador). This amounts to almost 72,000,000 acres (29,000,000 ha’s), just shy of the total acres of mechanically planted corn in the US. Despite the fact that third world maize yields are generally less than 2.0 Mg/ha (*Dowswell et al., 1996), a 25% yield increase on 60% of the hand planted maize area in the third world would be worth more than 2 billion dollars/year. For some time, the developing world has needed a hand planter capable of singulating seed with every strike and that removes the chemically treated seeds from their hands.

Exemplary farmers ignite both innovation and progress. In order to capitalize on farmer innovation we have to deliver products that allow them to move forward. The GreenSeeder puts that opportunity in their hands. Additionally, the GreenSeeder also serves as a mid-season fertilizer applicator by simply changing the internal drum. Getting urea fertilizer incorporated into the soil has a striking effect on improved use efficiency, by avoiding ammonia volatilization losses when urea is surface applied. Finally, homeowners, gardeners, wildlife enthusiasts will all find added value in this planter for virtually all kinds of seeds.

- Remove chemically treated seeds from the hands of small farmers
- Decrease soil erosion from improved plant spacing
- Accommodate mid-season applications of urea-N fertilizer
- Place urea below the surface reducing NH₃ losses
- Potential to provide significant increases in third world corn production.

Maize production embodies one of many uses that the GreenSeeder planter has. Legume interseeding systems can be more easily established, especially for maize-phaseolus systems common in Central America. Mid-season fertilizer application with the GreenSeeder allows farmers to improve fertilizer use efficiency and ultimately profit. Internal drums, machined or modified, can plant virtually any “relay” crop in maize. Whether the seed size is small or large, the GreenSeeder planter will accommodate what you seek in terms of sowing capabilities.

Gardeners are encouraged to use the GreenSeeder for every plant type available to them. Similarly, those in the wildlife and food plot areas should consider using the GreenSeeder to improve emergence of seeds they are hoping to establish in remote areas that cannot be met by mechanized means. Advanced planting techniques such as intercropping and no-till practices are now easier and cheaper with the GreenSeeder.

More experimentation means modifications of the planting tip and internal drum are anticipated. Having a planter that can adapt to local needs is critical in our design. Drawing input from the global community is crucial to meet the needs of an ever changing planet. Help us help each other by using the Contact page, or direct to bill.raun@okstate.edu or randy.taylor@okstate.edu.

You cannot build a peaceful world on empty stomachs and human misery.

—Norman Borlaug, 1970 Nobel Peace Prize Laureate
### PARTS LIST

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Steel Pin With Wire Lock</strong></td>
<td>- Pin Diameter: 3/8”&lt;br&gt;- Usable Length: 2 1/2”&lt;br&gt;- Pin Length: 3 1/8”&lt;br&gt;- Inside Clearance: 1 5/8”</td>
</tr>
<tr>
<td><strong>PVC Threaded Adapter</strong></td>
<td>- Nominal Diameter: 1 1/2”</td>
</tr>
<tr>
<td><strong>Singulation Drums X2</strong></td>
<td>- Nominal Diameter: 1”&lt;br&gt;- Nominal Length: 2 1/2”&lt;br&gt;(Maize and Urea Drums included)&lt;br&gt;(Urea Drum delivers 1.5 g/strike)</td>
</tr>
<tr>
<td><strong>Transfer Arm</strong></td>
<td>- Slot Diameter: 1”&lt;br&gt;- Nominal Length: 2.5”</td>
</tr>
<tr>
<td><strong>Separate Wire Pin</strong></td>
<td>- Wire Diameter: 0.1”&lt;br&gt;(May not look exactly like image)</td>
</tr>
<tr>
<td><strong>Outer Housing</strong></td>
<td>- Material: Aluminum&lt;br&gt;- Bottom Hole Diameter: 1/4”</td>
</tr>
<tr>
<td><strong>Inner Barrel</strong></td>
<td>- Material: Plastic&lt;br&gt;- Thread: NPT 1 1/2”&lt;br&gt;(Built-In Brush Not Pictured)</td>
</tr>
<tr>
<td><strong>Compression Spring</strong></td>
<td>- Material: Stainless Steel&lt;br&gt;- Diameter: 2”</td>
</tr>
<tr>
<td><strong>Bushing/Tip</strong></td>
<td>- Material: Steel&lt;br&gt;- Collar Diameter: 2”</td>
</tr>
</tbody>
</table>

Note: Not to Scale
1. Locate the *singulation drum* and *transfer arm*. Plug the *seed drum* into the *transfer arm*.
2. *Drum and arm assembly.*
3. Locate the *inner barrel* and *outer housing*. Insert the *inner barrel* into the *outer housing*.
4. Insert the *drum and arm assembly* through the *outer housing* into the *inner barrel*.
5. Ensure the outer housing pin is in the transfer arm slot.

6. Secure the transfer arm by inserting the washer and wire pin into the outer housing pin.

7. Barrel and housing assembly.

8. Locate the spring and bushing/tip. Insert the spring then bushing/tip into the outer housing.
9. Locate the **steel pin with wire lock**, and insert in the **outer barrel** to secure the **bushing/tip**.

10. *GreenSeeder Assembly.*
Operating the GreenSeeder

1. Fill the PVC pipe handle with approximately 1 kg of selected seed. A satisfactory funnel for filling/re-filling the PVC pipe (seed reservoir) can be made of a cut-off 2 liter bottle.
   - Optional: Lay planting string clearly marked with correct spacing, for research plots, where specific population counts are needed.
   - Hold the hand planter vertically (approximately at right angle) to the ground surface.
2. Strike the soil with the planter leaning towards the operator.
   - While holding the planter in that position, with the planter tip in the ground, move the handle forward (away from the operator) until the planter is almost perpendicular to the ground.
3. Pull the hand planter out of the hole to drop the seed.
   - Repeat as needed to complete the entire field.
   - Clear the tip of impacted soil if needed.
   - Refill the PVC pipe with seeds when almost empty.

Precautions and Safety Measures

- Do not strike the ground with the planter too close to your feet. This may cause an unexpected injury.
- Do not use the planter on extremely hard ground, as this will lead to planter failure.
- Do not handle treated seeds with bare hands. Use gloves to avoid direct contact with treated seeds.
- Wash your hands thoroughly with soap after planting.

Additional Information

- The Urea Drum provides 1.5 g urea per strike per plant (population of 70,000 seeds/hectare) equating to 50 kg N/ha.
Supply and Distribution

Joshua Campbell
USA
joshuacampbell@indigdev.com

Chad Ward
USA
chadward@indigdev.com

www.smallfarmtoolbox.com/greenseeder

Joshua Ringer
USA, Thailand, Vietnam
joshuaringer@indigdev.com

Design and Manufacturing

Randy Taylor
OK, USA
randy.taylor@okstate.edu

Bill Raun
Central America, USA
bill.raun@okstate.edu

www.nue.okstate.edu/Hand_Planter.htm

Eric Lam
USA, Honduras, Bangladesh
eric.lam@okstate.edu

www.aguaseis.org/terraseis
<table>
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<tr>
<th>Plot Number</th>
<th>Method Type</th>
<th>Preplant N rate, kg/ha</th>
<th>Distance Between Seeds, cm</th>
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<td>Local</td>
</tr>
<tr>
<td>2</td>
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<tr>
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<td>GreenSeeder</td>
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<td>18</td>
</tr>
<tr>
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<td>GreenSeeder</td>
<td>50</td>
<td>18</td>
</tr>
<tr>
<td>6</td>
<td>GreenSeeder</td>
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<tr>
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<td>GreenSeeder</td>
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<td>25</td>
</tr>
<tr>
<td>9</td>
<td>GreenSeeder</td>
<td>100</td>
<td>25</td>
</tr>
</tbody>
</table>

10, User's Choice

Notes

Note additional information including grain yield by plot, row width, planting date, harvest date, estimated rainfall, average temperature, type of seed used, and anything else.
Feeding the World
One Seed at a Time