Repairing Flood Damaged Fields

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Boone County

Extension
University of Missouri
3 Stages to Repair Flood Damaged Fields

• Remove Debris and Sediment
• Repair Erosion
• Manage Other Factors
Tools for Assessment (June 2) – Remote Sensing, planet.com
Tools for Assessment (Apr 8) – Remote Sensing, planet.com
Tools for Assessment (June 30) – Remote Sensing, planet.com
Tools for Assessment (Nov 19) – Remote Sensing, planet.com
Tools for Assessment – Utilizing a Drone

Removing Debris

• Plant Material
• Other

• Information and guidance regarding debris can be found through the Missouri Department of Natural Resources at: [https://dnr.mo.gov/disaster.htm](https://dnr.mo.gov/disaster.htm) or by contacting the Regional Missouri DNR Office.
Dealing with Sediment

• Rules of Thumb
  • 0-2 inches: incorporate with normal tillage operations
  • 2-8 inches: incorporate with chisel or moldboard plow
  • More than 8 inches: spread or remove to a depth of 8 inches or less and incorporate as listed above

• Tillage of the native soil should be the depth of the sand plus 1.5 times the depth of sand; for example, one would till 10 inches deep for 4 inches of sand \([4 + (1.5 \times 4) = 10]\).

• Avoid tillage or other field operations until soil is dry enough to reduce the chance of compaction.
Dealing with Sand
# How to Incorporate Sand

<table>
<thead>
<tr>
<th>Soil Beneath the Sand</th>
<th>2&quot; sand deposit</th>
<th>4&quot; sand deposit</th>
<th>6&quot; sand deposit</th>
<th>12&quot; sand deposit</th>
<th>18&quot; sand deposit</th>
<th>24&quot; sand deposit</th>
<th>30&quot; sand deposit</th>
<th>36&quot; sand deposit</th>
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<tbody>
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<td>Silt Loam</td>
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<td>Loamy Very Fine Sand</td>
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Tillage will not improve the ability of these soils to hold water.
How to Incorporate Sand

After the flood of 1993 dumped lots of sand on some fields, yields have been lower, especially in dry years. East central Missouri farmer Danny Kuenzel and some of his friends have hired an excavator to dig up good soil and bring it back to the surface.

Photo by Benjamin Herrold - Missouri Farmer Today - https://tinyurl.com/rac48wp
How to Incorporate Sand

For use with tractors in the 375 – 600hp range
Working width of 16 ft to 19.5 ft

Disk diameter – 36” to 42” (13” to 15” tillage depth)

How to Incorporate Sand

This is the largest Baker plow that Allen Machine & Equipment has ever built. The 4 round disc blades are approximately 52" in diameter and can plow up to 48" deep even in hard clay and sand! This plow is being pulled by an 865 Challenger with tracks. The tractor has 525 horsepower. Together this package weighs over 70,000 lbs.

http://www.allenmachineandequipment.com/
How to Incorporate Sand

Plow near Hartsburg, MO
Hilgedick Farms

Source: https://youtu.be/TCxSDrsjvao
Table 3. Coefficient of traction for tires and tracks on various soils.

<table>
<thead>
<tr>
<th>Material</th>
<th>Traction Factors</th>
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<tr>
<td></td>
<td>Rubber</td>
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<tr>
<td></td>
<td>Tires</td>
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<tr>
<td>Concrete</td>
<td>.90</td>
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<tr>
<td>Clay loam, dry</td>
<td>.55</td>
</tr>
<tr>
<td>Clay loam, wet</td>
<td>.45</td>
</tr>
<tr>
<td>Clay loam, rutted</td>
<td>.40</td>
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<tr>
<td>Firm earth</td>
<td>.55</td>
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<tr>
<td>Loose earth</td>
<td>.45</td>
</tr>
<tr>
<td>Sand, dry</td>
<td>.20</td>
</tr>
<tr>
<td>Sand, wet</td>
<td>.40</td>
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<tr>
<td>Gravel road, loose not</td>
<td>.36</td>
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<tr>
<td></td>
<td>hard</td>
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<td>Packed snow</td>
<td>.20</td>
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Note: Rubber-tired tractors are tested at Nebraska on a concrete track.
Traction and Sand Incorporation

PTO HP – 324
Weight – 36050 lbs

Pull on dry sand would be **10815 lbs**
or 36050 x .3

On Loose Soil – 36050 x .6
**21630 lbs**

PTO HP – 322
Weight – 47895 lbs

Pull on dry sand would be **9579 lbs**
or 47895 x .2

On Loose Soil – 36050 x .45
**16223 lbs**

Challenger MT738

John Deere 9620R
Measuring Depth of Sand – Utilizing Soil Electrical Conductivity (EC)

- 26.10 to 31.03
- 31.03 to 35.96
- 35.96 to 40.89
- 40.89 to 45.82
- 45.82 to 50.75
- 50.75 to 55.68
- 55.68 to 60.61
- 60.61 to 65.54
- 65.54 to 70.47
- 70.47 to 75.41
Geonics EM38

- Vertical (shown) and horizontal operating modes give sensing depths of 1.5 m and 1.0 m, respectively.
EM38 - Principle of Operation

Transmitting Coil

Receiving Coil

28.3

Transmitting Coil

Receiving Coil

58.6

Topsoil 25-30% Clay

Subsoil 55-65% Clay
Development of Productivity Zones

- Use of Soil Electrical Conductivity and Past Years’ Yield Maps
Development of Productivity Zones

Soil EC in mS/m
- 6.3 - 28
- 28 - 45
- 45 - 134.7

Field Boundary

Productivity Zones
- Low
- Medium
- High
Mapping of sand deposition from 1993 midwest floods with electromagnetic induction measurements
N.R. Kitchen, K.A. Sudduth, and S.T. Drummond
Research from 1993 Flood

Mapping of sand deposition from 1993 midwest floods with electromagnetic induction measurements
N.R. Kitchen, K.A. Sudduth, and S.T. Drummond
Repairing Erosion

• The degree of erosion can vary from a few inches to many feet and different levels need to be managed differently.
  • Tillage – if soil can be smoothed and farmed following a normal tillage operation
  • Earth Moving – if erosion is too deep to be corrected with tillage, but can be filled, then farmed. Fill eroded areas or top dress with native soil from other parts of the field, depending on the depth of the erosion.
  • Abandonment – may be the only option if erosion is too deep to correct economically, even with earth moving
Managing Other Factors

• Soil Crusting - Surface soil texture changes and the loss of structure can cause effects resembling compaction. This can restrict root penetration and reduce water infiltration. Tillage should remedy a shallow (less than 2-inch) crust.

• Wind Erosion and Planting Cover Crops - Sedimentation and the removal of crop residues from the soil surface may lead to wind erosion. The easiest way to reduce this is by seeding a cover crop as soon as conditions permit.
Questions ????

Kathy and Willie Aholt photo showing the Post plow and 4 dozers near Jefferson City (capital in the background) Cover of September 1994 Missouri Ruralist. (Photo by Linda Giest)

The Post plow mixed sand left by the 1993 flood. (Photo courtesy of Willie Aholt)
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