Cropping system improvements and innovation

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Global Cropping Systems Designs for Mitigating and Adapting to Climate Change

Dr WL Pan, Washington State University moderator

- Rotational Designs
- Nutrient balances, management
- Water Use
- Conservation Systems
- Livestock/Crop Integration
Inland Pacific Northwest US Cropping Systems Research

PNW experiments distributed amongst 4 zones representing annual available water gradient from 200-600 mm rainfed + irrigated

Major AECs defined:
1. Annual Cropping (<10% fallow)
2. Annual Crop-Fallow Transition (10-40% fallow)
3. Grain-Fallow (>40% fallow)
4. Irrigated (continuous cropped circles)

3 million ha, 27% fallow, 45% wheat
Agricultural Changes in Nutrient Cycling

Trophic pyramid (modified from Magdoff et al., 1997)

1. Primitive agriculture
2. Urbanization
3. Industrial Agriculture
4. Livestock/crop re-integration?
Climate Change Need Areas

- Intensification and diversification
- Ecophysiologically and economically driven agronomic systems design
- C, N, H$_2$O balances
- SOM quality and quantity
- Subsoil quality
Figure by Tai Maaz
# AEZ-specific Alternative Systems; Win-Win Scenarios

<table>
<thead>
<tr>
<th>AEZ</th>
<th>Convention</th>
<th>Alternative rotation</th>
<th>Alternative res/soil mgmt</th>
<th>Win – win</th>
<th>GHG NUE $ pest</th>
<th>Red WUE cntrl</th>
</tr>
</thead>
<tbody>
<tr>
<td>High rainfall</td>
<td>RTill</td>
<td>1.WW 2.SC 3.Leg</td>
<td>DS, precision nutr. &amp; straw harvest</td>
<td>Y Y +/-</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Low rainfall</td>
<td>RTill 1. WW 2. F</td>
<td>1.WW/WC/WL 2. Chem F</td>
<td>DS, stripper header, organics</td>
<td>Y Y +/-</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>
Case Stories:
System Wide New Crop Adaptation
Thank you!