Mineral Nitrogen and Rice Production in Myanmar

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Outline

• Country Profile
• Myanmar and Rice Production
• Mineral Nitrogen, Food Security and Nutrition
• Whither a miracle nutrient?
• Mineral Nitrogen and Future Research in Myanmar
• Conclusion
Country Profile

- **Land Area**: 676,557 Km$^2$, between 9 32’ N to 28 32’ N; 92 10’ E to 101 11’ E
- **Population**: 51.7 Million
  - Growth rate of 1.75%,
  - 135 nationalities
  - Population density: 76/km$^2$
- **GDP**: 44.28 $ Billion

**Social Indicators**
- Life Expectancy ($\ddagger$) - 67.5 ($\varpi$) - 69.9
- Mortality Rate (under 5) - 2.83%
- Birth Rate - 67.1%

*Source*: Ministry of Agriculture and Irrigation (MoAI), 2015
Myanmar and Rice Production

Source: MoAI, 2015
Rural area

Agricultural sector employs 61.2% of the labour force (MoAI, 2014)

Employment

Population

70% of population live in rural areas. (MoAI, 2014)

GDP

Agricultural sector accounts for 22.1% of total GDP (MoAI, 2014)

Agriculture
Sown Area of Crop Groups

Crop Groups
- Cereal Crops: 39%
- Oil Crops: 16%
- Pulses: 21%
- Industrial Crops: 6%
- Culinary Crops: 2%
- Other Crops: 6%

Source: MOAI, 2015
Sown Area of Cereal Crops

Major rice growing areas

<table>
<thead>
<tr>
<th>Divisions</th>
<th>Share in rice production (%)</th>
<th>Share in population (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ayeyarwady</td>
<td>26</td>
<td>13</td>
</tr>
<tr>
<td>Bago</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>Sagaing</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Yangon</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Others</td>
<td>39</td>
<td>53</td>
</tr>
</tbody>
</table>
Fertilizer Use and Rice Yield (1995 - 2009)

Fertiliser use in NPK (kg ha\(^{-1}\))

Yield (t ha\(^{-1}\))

![Graph showing fertiliser use and yield over years]

- Indonesia
- Philippine
- Thiland
- Bangladesh
- Vietnam
- Myanmar
- Cambodia

Year

Year
Fertilizer Use and Rice Yield (2009)

Fertiliser use in NPK (kg ha\(^{-1}\))

<table>
<thead>
<tr>
<th>Country</th>
<th>Fertiliser use (kg ha(^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodia</td>
<td>9.58</td>
</tr>
<tr>
<td>Myanmar</td>
<td>5</td>
</tr>
<tr>
<td>Vietnam</td>
<td>125</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>282</td>
</tr>
<tr>
<td>Thailand</td>
<td>140</td>
</tr>
<tr>
<td>Philippines</td>
<td>181</td>
</tr>
<tr>
<td>Indonesia</td>
<td>402</td>
</tr>
</tbody>
</table>

Yield (t ha\(^{-1}\))

<table>
<thead>
<tr>
<th>Country</th>
<th>Yield (t ha(^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodia</td>
<td>2.84</td>
</tr>
<tr>
<td>Myanmar</td>
<td>4.09</td>
</tr>
<tr>
<td>Vietnam</td>
<td>5.24</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>4.2</td>
</tr>
<tr>
<td>Thailand</td>
<td>2.88</td>
</tr>
<tr>
<td>Philippine</td>
<td>3.59</td>
</tr>
<tr>
<td>Indonesia</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Rice Almanac, 2013
Mineral Nitrogen, Food Security and Nutrition

• N was the most limiting nutrient for lowland rice  
  (Denning et.al (2013) and Aung Naing Oo et.al (2016))

• Limited use of mineral fertilisers is a major factor limiting rice productivity in Myanmar  
  (Garcia et al., 1999).

• N increase grain yield and protein content  
  (Eppendorfer 1975, Htain Lin Tun et.al, 2007)
Fertilizer input and paddy yield in Myanmar

(Matsuda, 2016)

- Lowland farming in China and Vietnam (17–21)
- Namkhan, China border in Myanmar (22)
- High-input type (e.g., irrigated lowland in Myanmar) (28)
- Low-input type (e.g., rain-fed lowland) (60)

Note: Number in the parentheses mean approximate value of fertilizer use efficiency.
Mineral Nitrogen and Future Research in Myanmar

• National rice yield is stagnant at 3~4 t ha\(^{-1}\) since 1995
• Nitrogen (N) rates applied by Myanmar farmers are generally low: Fertiliser rates 5 to 21 kg NPK ha\(^{-1}\) (1995-2009)
• No consideration from economic aspects and environmental issues.
• Future research based on economic and environmental issues should be prioritized for the collaborative research works with international organizations.
MoU signing ceremony between Yezin Agricultural University and ACIAR

Joint Planning Meeting of
SMCN/2014/044: Management of Nutrients for Improved Profitability and Sustainability of Crop Production in Central Myanmar and
LWR/2014/075: Land Resource Evaluation for Protective and Resilient Landscapes in Central Dryzone of Myanmar

3.5.2016 to 5.5.2016
SMCN/2014/044: Management of Nutrients for Improved Profitability and Sustainability of Crop Production in Central Myanmar
Location of the Experimental Sites

Tatkon Farm (DAR), Tatkon Township
Laythar Village, Nay Pyi Taw
YAU Farm, Nay Pyi Taw
Taungoo Township
### Cropping Pattern at Different Locations

<table>
<thead>
<tr>
<th>No.</th>
<th>Site</th>
<th>Location</th>
<th>Crops</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Yezin (YAU farm)</td>
<td>19° 50' 08.9&quot; N 96° 15' 49.9&quot; E</td>
<td>Rice-rice</td>
</tr>
<tr>
<td>2.</td>
<td>Tatkon (DAR farm)</td>
<td>20° 08' 16.1&quot; N 96° 12' 50.6&quot; E</td>
<td>Maize-legume</td>
</tr>
<tr>
<td>3.</td>
<td>Laythar (farmer’s field)</td>
<td>19° 51' 23.8&quot; N 96° 14' 50.0&quot; E</td>
<td>Maize-legume</td>
</tr>
<tr>
<td>4.</td>
<td>Taungoo (farmer’s field)</td>
<td>18° 55' 18.5&quot; N 96° 19' 50.7&quot; E</td>
<td>Rice-rice</td>
</tr>
</tbody>
</table>
Visiting YAU Laboratory
Visiting YAU Laboratory
Visiting Experimental Sites
Conclusion

• Myanmar - large area of land and sufficient water resources to extend rice production

• Research on mineral nitrogen and rice productivity for decades