The Good Growth Plan: A Geospatial Approach
Safe harbor

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We need to find better ways to feed the world

870 million people go to bed hungry
70% of them depend on farming

9 billion people by 2050

Every day the world’s population increases by 200,000
The farmer’s world is increasingly complex

- Global Financial Instability
- Value Chain
- Government and Regulators
- Societal Pressures
- Future Farmer
- Input Costs
- Environmental Pressures
With passionate people and comprehensive capability

$1.3 billion annual R&D investment and more than 5,000 R&D staff

Over 28,000 employees in some 90 countries

$12.8 billion sales in 2016
Since the 90s, the world’s farmers are growing more from less.

- Since the 50s, the U.S. agricultural output increased by 100%, but requires only 0.05% more inputs, 25% less farmland and 78% less labor.

- Investment in agricultural R&D and farmer training are main drivers of sustainable productivity growth.

- Sustainable productivity growth must grow globally by 1.75% per year to feed a growing world. Government spending is declining and the private sector has taken up the slack.

The Good Growth Plan shows Syngenta’s contribution to global food security.

By 2020,

- **More food, Less waste**
  - Make crops more efficient
  - Increase average productivity of the world’s major crops by 20% without using more land, water or inputs

- **More biodiversity, Less degradation**
  - Rescue more farmland
  - Improve the fertility of 10 million hectares of farmland on the brink of degradation
  - Help biodiversity flourish
  - Enhance biodiversity on 5 million hectares of farmland

- **More health, Less poverty**
  - Empower smallholders
  - Reach 20 million smallholders and enable them to increase productivity by 50%
  - Help people stay safe
  - Train 20 million farm workers on labor safety, especially in developing countries
  - Look after every worker
  - Strive for fair labor conditions throughout our entire supply chain network

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Syngenta’s progress on The Good Growth Plan in 2016

<table>
<thead>
<tr>
<th>Make crops more efficient</th>
<th>Rescue farmland</th>
<th>Enhance biodiversity</th>
<th>Empower smallholders</th>
<th>Help people stay safe</th>
<th>Look after every worker</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,700+ farms</td>
<td>4.3 million</td>
<td>4.9 million</td>
<td>16.6 million</td>
<td>17.2 million</td>
<td>82% of total</td>
</tr>
<tr>
<td>23 crops across 42 countries</td>
<td>hectares of benefited farmland</td>
<td>hectares of benefited farmland</td>
<td>smallholders reached</td>
<td>farm workers trained</td>
<td>of seed supply farms are now in our Fair Labor Program</td>
</tr>
</tbody>
</table>

8% global average productivity increase among smallholders

Toward our 2020 target of 20% more efficiency
Toward our target goal of 10m hectares
Toward our 2020 target of 5m hectares
Toward our 2020 target of 20 million
Toward our 2020 target of fair labor throughout supply chain

www.goodgrowthplan.com
Since 2014, Syngenta reference farms (RF) over-performed benchmark farms (BF) by 3.8% points in yield evolution.
Enterprising Data

- By enterprising all of geospatial data we were able to streamline data integration and consumption.
- Our platform consisted of a SQL Server database backend, ArcGIS Server, and Portal for ArcGIS.
The Good Growth Plan Web Application

- Development of the web application allowed for **dynamic editing** of farm locations
- Through improving our **spatial accuracy** of farm locations we are able to examine how environmental variables influence **crop performance**.
Farm performance is influenced by many factors

- Environmental factors that influence the extent of crop agriculture are terrain, climate, soil properties, and soil water. These are the four factors that allow specific crops to be grown in certain areas.

- Understanding the spatial variability of soil physical and hydraulic properties is vital for precision farming and for the assessment of agricultural management practices.
How does field performance compare over time? The vegetation trend can be compared over years to validate reported productivity trends, which also works as an internal control for auditability.

Comparing trends in vegetation with actual reported yield data can be used to quality control the progress data provided by Market Probe.
When to engage with my reference grower? The aggregated vegetation graph helps field advisors understand when major crop events are happening on the field. These present opportunities to engage with growers.

- **Planting event**: ACTION: Call grower after planting.
- **Some weed development occurs.**
- **Stagnant crop growth could be due to a pest or disease.** ACTION: Check within-field vegetation (below) and call grower to discuss measures.
- **Vegetation has reached its maximum.**
- **This grower’s vegetation is much lower than the vegetation of his/her peers and the average in the area.**
- **Within-field vegetation shows major stress areas on January 21st.**
- **Information is provided on a daily basis and updated every week.**
How can I help the grower? Within-field variability of crop growth helps sales reps and agronomists to discover pest or nutrient issues.

The different colors indicate uneven crop growth. The lighter areas might have a pest or nutrient problem.

**ACTION:** Request a field scout report and discuss corrective measures with grower.

Same picture as above, but with higher contrast to easily discover problematic areas within the field.
Sharing our success through Open Data initiatives

- Since we launched The Good Growth Plan, we’ve established a solid foundation for reporting on progress that relies on independent data collection and validation, assurance by 3rd party assurance providers, and endorsement through our implementing partners.

- We publish our data to be transparent, accountable, and engage with our stakeholders in a different, new kind of dialogue.

- Through partnerships with the Open Data Institute and GODAN we are building our skills and capabilities in open data.