The Good Growth Plan Progress Data - Productivity 2019

Make crops more efficient

1. Summary

Syngenta is committed to increasing crop productivity and to using limited resources such as land, water and inputs more efficiently. Since 2014, we have been measuring trends in agricultural input efficiency on a global network of real farms. Progress is tracked against The Good Growth Plan (GGP) goal to increase productivity by 20% by 2020 without using more inputs or resources.

The Productivity 2019 dataset shows aggregated productivity and resource efficiency indicators for years 2014, 2015, 2016, 2017, 2018 and 2019 where available. The recent data has been collected from more than 4000 farms and covers more than 20 different crops in 42 countries. The data (except USA data) was collected, consolidated and reported by Kynetec[1], an independent market research agency.

Farms are grouped in clusters, which represent a crop grown in an area with homogenous agro-ecological conditions by comparable types of farms. The sample includes reference and benchmark farms: reference farms were selected by Syngenta and benchmark farms were randomly selected by Kynetec within the same cluster. Data collection was carried out by Kynetec using a structured questionnaire and face-to-face interviews with participating growers. Data was collected on the usage of inputs, such as crop protection products, fertilizers, seeding rates, labor hours, machinery usage hours, and marketable crop yield on a per hectare basis.

2. Structure of the data

Data sets are at cluster-level.

Variable name	Definition	Unit	Type of data
HarvestYear	Year the crop was harvested		String
ReportingYear	Syngenta definition of reporting year for non-financial indicators		String
Country	Country		String
Crop	Crop		String
ClusterID	Unique cluster identifier		String
Farms	Number of farms	farms	Numeric
AreaSizeMin	Minimum field size	hectares	Numeric
AreaSizeAvg	Average field size	hectares	Numeric
AreaSizeMax	Maximum field size	hectares	Numeric
CropSizeMin	Minimum crop size in hectares	hectares	Numeric
CropSizeAvg	Average crop size in hectares	hectares	Numeric

[1] Previously Market Probe Agriculture & Animal Health, which is now part of the Kynetec Group. For more information visit https://www.kynetec.com/.

CropSizeMax	Maximum crop size in hectares	hectares	Numeric
FarmSizeMin	Minimum farm size in hectares	hectares	Numeric
FarmSizeAvg	Average farm size in hectares	hectares	Numeric
FarmSizeMax	Maximum farm size in hectares	hectares	Numeric
LandProductivity	Average land productivity as marketable crop yield per land unit	tons per hectare	Numeric
PesticideApplicationEfficiency	Average number of pesticide applications per metric ton of marketable crop yield	applications per ton	Numeric
NutrientEfficiency	Average amount of nitrogen equivalents in kg per metric ton of marketable crop yield	kg per ton	Numeric
PhosphorusEfficiency	Average amount of phosphorus equivalents in kg per metric ton of marketable crop yield	kg per ton	Numeric
PotassiumEfficiency	Average amount of potassium equivalents in kg per metric ton of marketable crop yield	kg per ton	Numeric
SeedEfficiency	Average amount of seed in kg per metric ton of marketable crop yield	kg per ton	Numeric
PesticideEfficiency	Average amount of crop protection active ingredients in kg per metric ton of marketable crop yield	kg per ton	Numeric
LaborEfficiency	Average amount of labor in manhours per metric ton of marketable crop yield	hours per ton	Numeric
MachineEfficiency	Average amount of machine hours per metric ton of marketable crop yield	hours per ton	Numeric
GHGEfficiency	Average amount of GHG emissions in kg CO2e per metric ton of marketable crop yield	kg per ton of	Numeric
SmallholderCluster	Farms are defined as smallholder farms		Categorical
Irrigated	Farm is irrigated		Categorical

3. Background and methods

The main objective of the farm network is to monitor progress on Syngenta's GGP commitment to increase crop productivity and resource efficiency. Crop output-input ratios are measured against set targets on real farms for selected crops and market segments relevant to Syngenta's commercial strategy. Syngenta considers a real-world situation and considers preferences and decisions made by its customer farmers.

3.1. Description of the farm network

The farm survey is designed as a longitudinal study that involves repeated observations of crop output-input ratios over several years on the same farms. Farms are grouped into clusters of similar farm characteristics, agro-ecological and market conditions. The reporting scope (countries, crops, customer segments) is determined and reviewed annually by Syngenta in line with its commercial strategy. The countries in scope have established targets which were baselined in 2014 and have to be met in 2020.

The sample includes reference and benchmark farms. The reference farms were selected by Syngenta and the benchmark farms were randomly and independently selected by Kynetec within the same cluster.

3.2. Progress measurement

The basis for progress management are productivity and efficiency percentage increases measured on reference farms. The global trend is measured against a 20% improvement target to be achieved by 2020. The baseline year is 2014, the starting year of the data collection. Key performance indicators (KPIs) represent partial measures of agricultural productivity:

- Land productivity
- Labor efficiency
- Nitrogen efficiency
- Seed efficiency
- Pesticide application efficiency
- Pesticide efficiency
- Machine efficiency
- GHG efficiency

The evolution over time for each KPI is calculated on cluster level. Outlier analysis and data cleansing at farm level is used to remove extreme outliers. Sensitivity analysis is used to test the robustness of results across different samples.

3.3. Key definitions

- **A reference farm** is managed by a respondent grower selected by Syngenta.
- **A benchmark farm i**s managed by a respondent grower randomly and independently selected by Kynetec using cluster screening criteria.
    - In USA, benchmark data is generated from USDA and other public data.
    - In UK, Germany, Spain and France, benchmark data for barley in particular is generated on reference farms using conventional practices.
- **A cluster** represents farms with similar agro-climatic conditions and farm characteristics according to screening criteria.
- **A farm** is a tract of land cultivated for the purpose of crop production within a specified crop cycle or crop season. One grower can provide data for multiple farms.

3.4. Farm metrics

a. Number of farms

Name	**Number of farms**
Unit of measurement	# (count)
Definition	The number of farms participating in the GGP farm
Calculation	Summing up the number of farms

b. Land Productivity

Name	**Land productivity**
Definition	Marketable crop yield in metric tons per hectare
Unit of measurement	tons/ha
Calculation	1. Crop output in metric tons per land unit for the respective crop periods is reported by the grower. 2. The output per land unit is converted to output per hectare.
Discussion/Limitations	Extreme observations can be problematic: high increases and decreases in crop yield can be driven by external factors (e.g. weather related stress, pest and diseases, etc.).

c. Land Productivity of Smallholders

Name	**Land productivity of Smallholders**
Definition	Marketable crop yield in metric tons per hectare of smallholder clusters
Unit of measurement	tons/ha
Calculation	Smallholder clusters are defined based on farm-size and country-specific definitions set forward in the GGP smallholder commitment. A cluster is defined as a smallholder cluster, if at least one reference and at least one benchmark farm are smallholders as per the farm-size definition and the cluster profile was established to be a smallholder cluster. If these requirements are met for two consecutive reporting periods, evolutions of land productivity will be calculated.
Discussion/Limitations	In some clusters, reference growers may be slightly larger than the cut-off size. The productivity open data provides details on minimum, average and maximum crop size per cluster.

	The approach differs somewhat from the approach used in the smallholder commitment, which defines smallholders based on crop size for technical reasons and to avoid double counting. Using farm size is more aligned with standard definitions of smallholders.

d. Nutrient efficiency

Name	**Nutrient efficiency**
Definition	Nitrogen input from chemical fertilizer applied in kilogram per metric ton of marketable crop yield
Unit of measurement	kg/ton
Calculation	1. Data on nitrogen input in weight per land unit from chemical fertilizer applied is reported by respondent growers. 2. The input per land unit is converted to input per hectare.
Discussion/Limitations	KPI does not consider the nitrogen balance in the soil and changes over time have to be interpreted carefully. KPI does not consider nitrogen inputs from organic fertilizer. Data for organic fertilizer input is available, but needs to be calculated to N equivalents using assumptions.

e. Pesticide Field Application efficiency

Name	**Pesticide field application efficiency**
Definition	Pesticide field application efficiency measured as the number of pesticide applications per metric ton of marketable crop yield. Included are fungicides, herbicides, and insecticides.
Unit of measurement	applications/ton
Calculation	1. Each pesticide treatment during the production cycle is recorded and reported by the respondent growers. 2. The number of pesticide applications per land unit is calculated by summing-up the number of treatments. In case two or more pesticides were applied as one application, they are counted as one treatment (e.g. tank mix). Seed treatment is not considered as a treatment. 3. To calculate pesticide application efficiency of a farm, the number of pesticide applications is divided by crop yield in ton.
Limitations	Application efficiency depends on the pest and disease pressure, which can vary season by season.

f. Greenhouse gas efficiency

Name	GHG emission efficiency
Definition	Greenhouse gas (GHG) emission efficiency measured as the kilograms of CO2 equivalents (CO_2e) per metric ton of marketable crop yield
Unit of measurement	Kg CO2e/ton
Calculation	Through online calculator www.coolfarmtool.org Data from harvest years 2014, 2015, 2016 and 2017 is used.
Limitations	Not all the input data required for the Cool Farm Tool online calculator may be obtained from farmers through interviews. Independently developed proxy values are assumed.

g. Phosphorus efficiency

Name	Phosphorus efficiency
Unit of measurement	Phosphorus in kg/t
Definition	Phosphorus input from chemical fertilizer applied in kilogram per metric ton marketable crop yield in the reporting year relative to the baseline
Calculation	1. Data on phosphorus input in kilogram per land unit from chemical fertilizer applied is reported by respondent growers. 2. The input per land unit is converted to input per hectare.
Discussion/Limitations	KPI does not consider the phosphorus balance in the soil and changes over time have to be interpreted carefully.

h. Potassium efficiency

Name	Potassium efficiency
Unit of measurement	Potassium in kg/t
Definition	Potassium input from chemical fertilizer applied in kilogram per metric ton marketable crop yield in the reporting year relative to the baseline
Calculation	1. Data on Potassium input in kilogram per land unit from chemical fertilizer applied is reported by respondent growers. 2. The input per land unit is converted to input per hectare.
Discussion/Limitations	KPI does not consider the Potassium balance in the soil and changes over time have to be interpreted carefully.

i. Pesticide AI efficiency

Name	**Pesticide AI efficiency index**
Unit of measurement	kg AI/ton
Definition	The average percentage change in pesticide active ingredient (AI) efficiency measured as the amount of pesticide AI input per metric ton of marketable crop output in the reporting year relative to the baseline. Included are active ingredients of fungicides, herbicides, insecticides, and seed treatment products. Not included are active ingredients of miticides, acaricides, rodenticides, nematicides, molluscicides, plant growth regulator, harvest aids, and adjuvants.
Calculation	1. Each pesticide application, including the brand name(s) of the product and dosage rate in gram or milliliter per land unit applied during the production cycle, is reported by the grower. 2. The input per land unit is converted to input per hectare. 3. The database www.homologa-new.com, label information, or other databases are used to obtain information on the active ingredient concentration of each pesticide product. The quantity of active ingredient input is measured as grams per liter or grams per kilogram product solvent. 4. The amount of active ingredient applied per hectare is calculated by multiplying the dosage rate with the active ingredient concentration. 5. The total amount of pesticide active ingredients applied in kilograms per hectare is calculated by taking the sum of active ingredients of all considered pesticide applications. 6. To calculate pesticide active ingredient efficiency, the total amount of pesticide active ingredients is divided by the crop yield in tons for each farm.
Limitations	Due to differences in the mode-of-action of different crop protection products, an increase in pesticide AI efficiency has limited interpretability.

j. Seed efficiency

Name	Seed efficiency
Unit of measurement	kg seeds/ton
Definition	The average percentage change in seed efficiency measured as kilograms of seeds per metric ton of marketable crop yield in the reporting year relative to the baseline year.

Calculation	1. The amount of seeds used in bags or kilograms per land unit is recorded and reported by the grower. 2. The input per land unit is converted to input per hectare. 3. For each farm, the amount of seeds used is divided by the crop yield, resulting in seed efficiency measured in kilograms of seed input per ton of crop output.

k. Labor efficiency

Name	Labor efficiency
Unit of measurement	manhours/ton
Definition	The average percentage change in labor efficiency measured as manhours per metric ton of marketable crop yield in the reporting year relative to the baseline year.
Calculation	1. The number of hours spent by all workers and the number of workers involved are recorded and reported by the grower for different farming activities. The activities include clearing, ploughing, digging, ridging, ripping, land leveling, greenhouse management, applying fertilizers, mulching, sowing or planting, scouting for pests and diseases, applying pesticides, irrigating, pruning, weeding, harvesting, post-harvest handling, and processing (incl. sorting). 2. The number of hours is multiplied by the number of people involved in each activity, resulting in manhours per activity. Manhours from all activities are summed up and divided by the growing area (field) size. 3. The input per land unit is converted to input per hectare. 4. For each farm, the total number of manhours is divided by the crop yield, resulting in labor efficiency measured in manhours per ton of crop output.
Limitations	Record-keeping of labor inputs for different farm activities is complex and time consuming and may not be consistent across farms.

l. Machine efficiency

Name	Machine efficiency index
Unit of measurement	machine hours/ton
Definition	The average percentage change in machine efficiency measured as machine hours per metric ton of marketable crop yield in the reporting year relative to the baseline year.

Calculation	1. The type of machine and the total hours it is used are recorded and reported by the grower for 21 different farming activities. The considered farm activities include clearing, ploughing, digging, ridging, ripping, land leveling, greenhouse management, applying fertilizers, mulching, sowing or planting, scouting for pests and diseases, applying pesticides, irrigating, pruning, weeding, harvesting, post-harvest handling, processing (incl. sorting), and other activities. 2. Machine-hours from all activities are summed up and divided by the growing area (field) size in hectare. 3. The input per land unit is converted to input per hectare. 4. For each farm, the total number of machine-hours is divided by crop yield, resulting in labor efficiency measured in machine-hours per ton of crop output.
Limitations	Record-keeping of machine inputs for different farm activities is complex and time consuming. Machine hours from different activities may be difficult to compare against each other. The indicator has to be interpreted with care.

m. Irrigation water efficiency

Name	Irrigation water efficiency
Unit of measurement	Liter/ton
Definition	The average percentage change in irrigation efficiency measured as liters of irrigation water input per metric ton of marketable crop yield in the reporting year relative to the baseline year.
Calculation	1. If a grower uses irrigation to grow crops, the amount of irrigation water used per land unit is estimated and reported by the grower 2. The input per land unit is converted to input per hectare.
Limitations	Tracking systems for use of irrigation water may be different across farms (e.g. water meters or sourcing from a river for free) and amounts used have to be compared with care. Climate conditions penalize farms with little rain that will need to irrigate more.

3.5. Data collection tools and process

The farm network scope is reviewed annually and determined in line with business priorities. Reference farm sign-up is organized through Syngenta’s commercial organization at country level. Reference grower characteristics are used to describe a cluster-specific profile, based on which Kynetec independently and randomly selects comparable benchmark growers to provide a control group within each cluster.

Sample sizes for each cluster are determined with the aim to measure statistically significant increases in crop efficiency over time. This is done by Kynetec based on target productivity increases and assumptions regarding the variability of farm metrics in each cluster. The smaller the expected increase, the larger the sample size needed to measure significant differences over time. Variability within clusters is assumed based on public research and expert opinion. In addition, growers are also grouped in clusters as a means of keeping variances under control, as well as distinguishing between growers in terms of crop size, region and technological level. A minimum sample size of 20 interviews per cluster is needed. The minimum number of reference farms is 5 of 20. The optimal number of reference farms is 10 of 20 (balanced sample).

The farm questionnaire is developed and reviewed annually by Syngenta and Kynetec. As different crops may have different farm management specifications, the final questionnaire is split into crop modules. The master questionnaire is translated into local languages, which are reviewed and approved locally. The questionnaire covers topics such as farm activities (e.g. crops grown), soil management and safe-use practices, detailed use of chemical fertilizer, pesticide quantity by application and pest pressure, seed variety and seeding rates, labor and machinery hours, irrigation water use, abiotic stresses (such as heavy rain, cold or lack of rainfall), crop yield, harvest time, post-harvest losses, crop sales and production costs.

Data collection takes place in line with the planting and harvesting times. The first section of the questionnaire is administered during the crop season after planting. The second section is administered after the harvest. Per respondent, information for up to two cultivation areas (i.e. plots, fields) is collected. The farmer interviews are conducted face-to-face in the local language by Kynetec interviewers using structured questionnaires. Respondents are introduced to the objectives of The Good Growth Plan and, if necessary, trained on recording input use and crop outputs. Local help desk support is provided by Kynetec throughout the season in case of questions.

Kynetec uses SPSS (Statistical Package for the Social Sciences) for data entry, cleaning, analysis, and reporting. After collection, the farm data is entered into a local database, reviewed, and quality-checked by the local Kynetec agency. In the case of missing values or inconsistencies, farmers are re-contacted. In some cases, grower data is verified with local experts (e.g. retailers) to ensure data accuracy and validity. After country-level cleaning, the farm-level data is submitted to the global Kynetec headquarters for processing. In the case of missing values or inconsistences, the local Kynetec office was re-contacted to clarify and solve issues.

The final results are shared with respondents in the farm network. Farmers are able to compare their individual performance to the respective cluster average, building an important starting point for future productivity increases.

3.6. Sources of data

The data are generated by the respondent reference and benchmark farmers who measure and report on their input use and crop outputs over the respective crop season.

Data	Data source	Data processing
Farm-level data for reference and benchmark farms in Algeria, Argentina, Australia, Bangladesh, Belgium, Brazil, China, Colombia, Costa Rica, Ecuador, Egypt, Guatemala, Honduras, Hungary, India, Indonesia, Italy, Ivory Coast, Japan, Jordan, Kenya, Malaysia, Mexico, Morocco, Pakistan, Paraguay, Peru, Philippines, Russia, South Africa, Spain, Tanzania, Thailand, The Netherlands, Ukraine, Venezuela, Vietnam, Zambia	Kynetec[2]	Kynetec
Farm-level data for reference farms in France	Datagri[3]	Kynetec
Farm-level data for benchmark farms in France	Kynetec	Kynetec
Farm-level reference data for farms in the USA	Syngenta	Syngenta
Cluster-level benchmark data for farms in the USA	– USDA/NASS crop yields – USDA/ARMS crop input data – USDA/Farm & Ranch Irrigation Survey – State Extension crop budgets – USDA/NASS crop acreage	Syngenta
Farm-level data for reference and benchmark Barley farms in Germany, UK, France and Spain	Syngenta	Kynetec
Pesticide active ingredient concentration	Homologa – The Global Crop Protection Database[4]. Label information from internal sources (e.g. regulatory functions) or internet search	Kynetec
Smallholder definitions based on farm size	Syngenta	Kynetec

3.7. Quality assurance

Various consistency checks and internal controls are implemented throughout the entire data collection and reporting process in order to ensure unbiased, high quality data.

- **Screening**: Each grower is screened and selected by Kynetec based on cluster-specific criteria to ensure a comparable group of growers within each cluster. This helps keeping variability low.

[2] http://www.marketprobeagricultureandanimalhealth.com/
[3] http://www.datagri.com/gestion/front/main/
[4] www.homologa-new.com

- **Evaluation of the questionnaire**: The questionnaire aligns with the global objective of the project and is adapted to the local context (e.g. interviewers and growers should understand what is asked). Each year the questionnaire is evaluated based on several criteria, and updated where needed.
- **Briefing of interviewers**: Each year, local interviewers – familiar with the local context of farming – are thoroughly briefed to fully comprehend the questionnaire to obtain unbiased, accurate answers from respondents.
- **Cross-validation of the answers**:
  - Kynetec captures all growers' responses through a digital data-entry tool. Various logical and consistency checks are automated in this tool (e.g. total crop size in hectares cannot be larger than farm size)
  - Kynetec cross validates the answers of the growers in three different ways:
    1. Within the grower (check if growers respond consistently during the interview)
    2. Across years (check if growers respond consistently throughout the years)
    3. Within cluster (compare a grower's responses with those of others in the group)
  - All the above mentioned inconsistencies are followed up by contacting the growers and asking them to verify their answers. The data is updated after verification. All updates are tracked.
- **Check and discuss evolutions and patterns**: Global evolutions are calculated, discussed and reviewed on a monthly basis jointly by Kynetec and Syngenta.
- **Sensitivity analysis**: sensitivity analysis is conducted to evaluate the global results in terms of outliers, retention rates and overall statistical robustness. The results of the sensitivity analysis are discussed jointly by Kynetec and Syngenta.
- Thanks to the above mentioned checks, irregularities in fertilizer usage data were discovered which had to be corrected:

  For data collection wave 2014, respondents were asked to give a total estimate of the fertilizer NPK-rates that were applied in the fields. From 2015 onwards, the questionnaire was redesigned to be more precise and obtain data by individual fertilizer products. The new method of measuring fertilizer inputs leads to more accurate results, but also makes a year-on-year comparison difficult. After evaluating several solutions to this problems, 2014 fertilizer usage (NPK input) was re-estimated by calculating a weighted average of fertilizer usage in the following years.

3.8. Calculation of Greenhouse Gas Efficiency

In 2017, Greenhouse Gas (GHG) efficiency was added as a new Key Performance Indicator to the GGP. For non-US data, GHG efficiency was calculated by using the Cool Farm Tool (CFT), an algorithm provided by the Cool Farm Alliance (CFA). The Cool Farm Alliance is a non-profit organization that aims to inform growers about on-farm decisions that reduce their environmental impact. Using the CFT calculator with GGP data imposed several challenges:

- The GGP data is collected in a different format to the required format of the CFT. Some variables have to be re-coded.
- Individual farm data would be stored on CFA servers when using the CFT and can be used for other purposes, which violates Syngenta's grower data confidentiality policy. To solve this problem, aggregated data (on cluster-level) is used to calculate the GHG efficiency.
- Data collected for the GGP does not include all the variables needed to calculate GHG efficiency. To close data gaps, proxies were independently developed by a 3rd party for each cluster (e.g. amount of electricity or amount of diesel consumed).

For US data, the Field to Market methodology and fieldprint calculator[5] are used is used to calculate GHG emissions.

3.9. Progress calculation

Progress is measured by comparing farm performance in terms of land productivity, nutrient efficiency, pesticide field application efficiency, greenhouse gas efficiency and water efficiency over time. The year-on-year evolution of those metrics is calculated on cluster-level. Percentage changes are then averaged at global level or any other relevant aggregate level.

Several modifications are made

- **Removing outliers:** Variable external conditions (e.g. weather) may affect the farm performance and distort the measurement of performance across reporting periods. The most volatile evolutions are dropped using outlier analysis.
- **Identifying smallholder clusters:** Smallholder clusters are defined as such according to definitions set forward in the Smallholder commitment of The Good Growth Plan.
- **Southern and Northern hemispheres:** Crop campaigns in the Northern hemisphere start in the first half of the calendar year; the harvest period falls in the second half of the calendar year. Crop campaigns in the Southern hemisphere usually start in the second half of the calendar year; the harvest period falls in to the first half of the next calendar year. Hence, the reporting year spans two calendar years. Clusters are classified into Southern and Northern hemisphere clusters to choose the correct reporting year. The tables below give a schematic view of how the harvest years fall in the calendar year (table 1) and the reporting years (table 2)

[5] https://calculator.fieldtomarket.org/fieldprint-calculator/

Table 1. Harvest data per calender year (and data collection wave)

2014	2015	2016	2017	2018
1st half of the year Harvest Southern Hemisphere (from 2013 southern campaign) Crop campaign Northeren hemisphere	1st half of the year Harvest Southern Hemisphere Crop campaign Northeren hemisphere	1st half of the year Harvest Southern Hemisphere Crop campaign Northeren hemisphere	1st half of the year Harvest Southern Hemisphere Crop campaign Northeren hemisphere	1st half of the year Harvest Southern Hemisphere Crop campaign Northeren hemisphere
2nd half of the year Harvest Northern Hemisphere Crop campaign Southern Hemisphere	2nd half of the year Harvest Northern Hemisphere Crop campaign Southern Hemisphere	2nd half of the year Harvest Northern Hemisphere Crop campaign Southern Hemisphere	2nd half of the year Harvest Northern Hemisphere Crop campaign Southern Hemisphere	ETC...

When the samples are determined, the KPIs are calculated as follows:

Aggregation of farm metrics to cluster level average. Averages are calculated by summing the farm metrics of the cluster and dividing by the number of farms (areas) in the cluster.

$$Y_j = \frac{\sum Y_{ij}}{n}$$

Where

- Y_j is the cluster average
- Y_{ij} is farm metric of growing area *i* in cluster *j*
- n is the number of farms (areas) within cluster *j*

Measuring cluster progress over time. The aggregated cluster level farm metrics are compared to those of the previous reporting year. Cluster progress over time is measured as a percentage change with respect to the previous reporting year to indicate a change in overall efficiency. All evolutions are calculated on cluster level. For land productivity it is calculated as:

- $\Delta Y_j^t = \left(\frac{Y_j^t}{Y_j^{t-1}} - 1\right) * 100$
- Where
  - ΔY_j^t is the percentage change of the farm metric average for cluster *j* in reporting year *t*
  - Y_j^t is the cluster average for cluster *j* in the current reporting year *t*
  - Y_j^{t-1} is the cluster average for cluster *j* in the previous reporting year *t-1*

For efficiency indicators (input/output), the inverse (output/input) is used. This allows an improvement in input efficiency to be represented by a positive percentage change.

- $\Delta Y_j^t = \left(\left(\frac{1}{\frac{\sum_{i=1}^n y_i^t}{n}} - \frac{1}{\frac{\sum_{i=1}^n y_i^{t-1}}{n}}\right) * \frac{\sum_{i=1}^n y_i^t}{n}\right) * 100 = \left(\frac{\sum_{i=1}^n y_i^t}{\sum_{i=1}^n y_i^{t-1}} - 1\right) * 100$

Measuring global progress in productivity over time. Progress on a global scale will be calculated as the average of the percent change over all clusters. To calculate this, we use what we call "evolutions", which represent a change between two reporting years using data from reporting year *t* and reporting year *t-1*. Evolutions across two reporting years are calculated as the average % change across the clusters:

- $\Delta Y^t = \frac{\sum \Delta Y_j^t}{n}$

Where

- $\sum \Delta Y_j^t$ is the sum of the percentage change across clusters
- ΔY^t is the average change across all cluster

Weighting global progress in productivity of smallholder clusters. For KPIs of smallholders we report the weighted average of all cluster evolutions. Weights will be applied as a function of the number of observations in a particular cluster. For example: if a certain cluster has 5 smallholder RF, and 100 smallholder RF take part in the entire sample, their evolution will get a weight of (5/100=) 5%. Smallholders' evolutions are weighted because the number of observations within a particular cluster can be limited. Technically, it is possible to have only one smallholder in a particular cluster. Therefore, we chose to weight the evolutions to prevent that one single smallholder gets to play a too important role in the calculation of the evolution.

Measuring global progress since the baseline. Moving forward in the reporting, progress across more than two consecutive reporting years is calculated by accumulating the global percentage evolutions. Evolutions are cumulated on reporting-year-level by multiplying the average changes between reporting years.

$$\%\, progress = \left(\frac{\Delta Y^{2014}}{100} + 1\right) * \left(\frac{\Delta Y^{2015}}{100} + 1\right) * \left(\frac{\Delta Y^{2016}}{100} + 1\right) * \left(\frac{\Delta Y^{2017}}{100} + 1\right) * \ldots * \left(\frac{\Delta Y^{2021}}{100} + 1\right)$$

3.10. Publication

The selected KPIs "Land Productivity", "Land Productivity of Smallholders", "Nutrient Efficiency", "Pesticide Application Efficiency" and "Greenhouse Gas Emissions" are published in the Syngenta Sustainable Business Review. The percentage change for both reference and benchmark farms is displayed as the average of land productivity and input efficiency changes over all clusters.

Cluster-level efficiency indicators are published as total values on www.goodgrowthplan.com for each cluster. This excludes cluster-level data for the USA. Results from reference and benchmark farms are anonymized and aggregated at cluster level to ensure data confidentiality of individual growers in clusters with small samples of reference farms.

4. Changes versus previous release

March 2020

- Updated with latest available data

5. Approval of non-financial performance

The Good Growth Plan data is published as a global aggregate in the Non-financial performance summary of the Sustainable Business Report 2029. This summary was approved by the Board of Directors on February 20, 2020. Syngenta's internal controls over non-financial reporting are designed to provide assurance to Syngenta's Board of Directors and management regarding the reliability of non-financial reporting and the preparation and fair presentation of the information published in the Non-financial performance summary. All internal controls, no matter how well designed, have inherent limitations and therefore may not prevent or detect misstatements. In designing internal controls over non-financial reporting, Syngenta used the criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). PricewaterhouseCoopers AG, Switzerland, an independent registered public accounting firm, has issued an opinion on Syngenta's Non-financial performance summary, which is included in the Sustainable Business Report 2019.

6. Contact information

For questions and inquiries regarding this dataset and documentation, please contact goodgrowthplan.data@syngenta.com.

7. Appendix

7.1. Overview on clusters and respective changes.

2014			2016		2016		2017
code	**label**	**code**	**label**	**code**	**label**	**code**	**label**
12101	AlgeriaWheat1	12101	AlgeriaWheat1	12101	OUT	12101	OUT
20701	ArgentinaMaize1	20701	ArgentinaMaize1	20701	ArgentinaMaize1	20701	OUT
20702	ArgentinaMaize2	20702	ArgentinaMaize2	20702	ArgentinaMaize2	20702	OUT
215101	ArgentinaSoybeanMaize1	215101	ArgentinaSoybeanMaize1	215101	ArgentinaSoybeanMaize1	215101	OUT
215102	ArgentinaSoybeanMaize2	215102	ArgentinaSoybeanMaize2	215102	ArgentinaSoybeanMaize2	215102	OUT
215202	ArgentinaSoybeanSunflower2	215202	ArgentinaSoybeanSunflower2	215202	ArgentinaSoybeanSunflower2	215202	OUT
21802	ArgentinaSunflowerSeed2	21802	ArgentinaSunflowerSeed2	21802	ArgentinaSunflowerSeed2	21802	OUT
22101	ArgentinaWheat1	22101	ArgentinaWheat1	22101	ArgentinaWheat1	22101	OUT
22102	ArgentinaWheat2	22102	ArgentinaWheat2	22102	ArgentinaWheat2	22102	OUT
						218211	ArgentinaSunflowerWheat1 (NEW!)
						221181	ArgentinaWheatSunflower1 (NEW!)
						215211	ArgentinaSoybeanWheat1 (NEW!)
						221151	ArgentinaWheatSoybean1 (NEW!)
						207151	ArgentinaCornSoybean1 (NEW!)
						215071	ArgentinaSoybeanCorn1 (NEW!)
30301	AustraliaBarley1	30301	AustraliaBarley1	30301	AustraliaBarley1	30301	OUT
32101	AustraliaWheat1	32101	AustraliaWheat1	32101	AustraliaWheat1	32101	OUT
41401	BangladeshRice1	41401	BangladeshRice1	41401	BangladeshRice1	41401	BangladeshRice1
50401	BelgiumCauliflower1	50401	BelgiumCauliflower1	50401	BelgiumCauliflower1	50401	BelgiumCauliflower1
60601	BrazilCoffee1	60601	BrazilCoffee1	60601	BrazilCoffee1	60601	BrazilCoffee1

60602	BrazilCoffee2	60602	BrazilCoffee2	60602	BrazilCoffee2	60602	BrazilCoffee2
60701	BrazilMaize1	60701	BrazilMaize1	60701	BrazilMaize1	60701	BrazilMaize1
61501	BrazilSoybean1	61501	BrazilSoybean1	61501	BrazilSoybean1	61501	BrazilSoybean1
61502	BrazilSoybean2	61502	BrazilSoybean2	61502	BrazilSoybean2	61502	BrazilSoybean2
61503	BrazilSoybean3	61503	BrazilSoybean3	61503	BrazilSoybean3	61503	BrazilSoybean3
61701	BrazilSugarcane1	61701	BrazilSugarcane1	61701	OUT	61701	OUT
61702	BrazilSugarcane2	61702	BrazilSugarcane2	61702	OUT	61702	OUT
61901	BrazilTomato1	61905	BrazilTomato1+2	61905	OUT	61905	OUT
61902	BrazilTomato2						
61903	BrazilTomato3	61903	BrazilTomato3	61903	OUT	61903	OUT
68803	BrazilTomato4	68803	BrazilTomato4	68803	OUT	68803	OUT
70701	ChinaMaize1	70706	ChinaMaize1+2	70706	ChinaMaize1+2	70706	OUT
70702	ChinaMaize2						
70703	ChinaMaize3	70703	ChinaMaize3	70703	ChinaMaize3	70709	ChinaMaize3+4+5
70704	ChinaMaize4	70704	ChinaMaize4	70704	ChinaMaize4		
70705	ChinaMaize5	70705	ChinaMaize5	70705	ChinaMaize5		
				70707	ChinaMaize6	70707	ChinaMaize6
				70708	ChinaMaize7	70708	ChinaMaize7
71301	ChinaPotato1	71303	ChinaPotato1+2	71303	ChinaPotato1+2	71303	ChinaPotato1+2
71302	ChinaPotato2						
714101	ChinaRice1early	714101	ChinaRice1early	714101	ChinaRice1early	714101	ChinaRice1early
714201	ChinaRice1late	714201	ChinaRice1late	714201	ChinaRice1late	714201	ChinaRice1late
714102	ChinaRice2early	714102	ChinaRice2early	714102	ChinaRice2early	714102	ChinaRice2early
714202	ChinaRice2late	714202	ChinaRice2late	714202	ChinaRice2late	714202	ChinaRice2late
71403	ChinaRice3	71403	ChinaRice3	71403	ChinaRice3	71403	ChinaRice1
71404	ChinaRice4	71404	ChinaRice4	71404	ChinaRice4	71404	ChinaRice4

71405	ChinaRice5	71405	ChinaRice5	71405	ChinaRice5	71405	ChinaRice5
80601	ColombiaCoffee1	80601	ColombiaCoffee1	80601	ColombiaCoffee1	80601	ColombiaCoffee1
80701	ColombiaMaize1	80721	ColombiaMaize1	80721	ColombiaMaize1	80723	ColombiaMaize1+2
		80711	ColombiaSilage1				
80702	ColombiaMaize2	80722	ColombiaMaize2	80722	ColombiaMaize2		
		80712	ColombiaSilage2				
81301	ColombiaPotato1	81301	ColombiaPotato1	81301	ColombiaPotato1	81301	ColombiaPotato1
81401	ColombiaRice1	81401	ColombiaRice1	81401	ColombiaRice1	81401	OUT
81901	ColombiaTomato1	81901	ColombiaTomato1	81901	ColombiaTomato1	81901	ColombiaTomato1
90201	Costa RicaBanana1	90201	Costa RicaBanana1	90201	CostaRicaBanana1	90201	OUT
110201	EcuadorBanana1	110201	EcuadorBanana1	110201	EcuadorBanana1	110201	OUT
110701	EcuadorMaize1	110701	EcuadorMaize1	110701	EcuadorMaize1	110701	EcuadorMaize1
111301	EcuadorPotato1	111301	EcuadorPotato1	111301	EcuadorPotato1	111301	EcuadorPotato1
111401	EcuadorRice1	111401	EcuadorRice1	111401	EcuadorRice1	111401	EcuadorRice1
121301	EgyptPotato1	121301	EgyptPotato1	121301	OUT	121301	OUT
121302	EgyptPotato2	121302	EgyptPotato2	121302	OUT	121302	OUT
121303	EgyptPotato3	121303	EgyptPotato3	121303	OUT	121303	OUT
121901	EgyptTomato1	121901	EgyptTomato1	121901	EgyptTomato1	121901	EgyptTomato1
122101	EgyptWheat1	122101	EgyptWheat1	122103	EgyptWheat1+2	122103	EgyptWheat1+2
122102	EgyptWheat2	122102	EgyptWheat2				
130301	FranceBarley1	130301	FranceBarley1	130301	FranceBarley1	130305	FranceBarley1+2+3
130302	FranceBarley2	130302	FranceBarley2	130302	FranceBarley2		
130303	FranceBarley3	130303	FranceBarley3	130303	FranceBarley3		
				130304	FranceBarleyHyvido4	130304	FranceBarleyHyvido4
130701	FranceMaize1	137201	FranceMaize1	137201	FranceMaize1	137203	FranceMaize1+2
		137101	FranceSilage1				

130702	FranceMaize2	137202	FranceMaize2	137202	FranceMaize2		
		137102	FranceSilage2				
130901	FranceGrape1	130901	FranceGrape1	130901	FranceGrapes1	130901	FranceGrapes1
130902	FranceGrape2	130902	FranceGrape2	130902	FranceGrapes2	130902	FranceGrapes2
130903	FranceGrape3	130903	FranceGrape3	130903	FranceGrapes3	130903	FranceGrapes3
131001	FranceOilseed rape1	131001	FranceOilseed rape1	131001	FranceOilseedrape1	131001	FranceOilseedrape1
131801	FranceSunflowerSeed1	131801	FranceSunflowerSeed1	131801	FranceSunflowerSeed1	131801	FranceSunflowerSeed1
141401	GhanaRice1	141401	OUT	141401	OUT	141401	OUT
150601	GuatemalaCoffee1	150601	GuatemalaCoffee1	150601	GuatemalaCoffee1	150601	GuatemalaCoffee1
150701	GuatemalaMaize1	150701	GuatemalaMaize1Grain	150701	GuatemalaMaize1	150701	GuatemalaMaize1
151701	GuatemalaSugarcane1	151701	GuatemalaSugarcane1	151701	GuatemalaSugarcane1	151701	OUT
160601	HondurasCoffee1	160601	HondurasCoffee1	160601	HondurasCoffee1	160601	HondurasCoffee1
170701	HungaryMaize1	170721	HungaryMaize1	170721	HungaryMaize1	170721	HungaryMaize1
		170711	HungarySilage1				
171001	HungaryOilseed rape1	171001	HungaryOilseed rape1	171001	HungaryOilseedrape1	171001	HungaryOilseedrape1
171801	HungarySunflowerSeed1	171801	HungarySunflowerSeed1	171801	HungarySunflowerseed1	171801	HungarySunflowerseed1
172101	HungaryWheat1	172101	HungaryWheat1	172101	HungaryWheat1	172101	HungaryWheat1
180701	IndiaMaize1	180721	IndiaMaize1	180721	IndiaMaize1	180721	IndiaMaize1
		180711	IndiaMaize1silage				
180801	IndiaCotton1	180801	IndiaCotton1	180801	IndiaCotton1	180801	IndiaCotton1
181401	IndiaRice1	181401	IndiaRice1	181401	IndiaRice1	181401	IndiaRice1
181402	IndiaRice2	181402	IndiaRice2	181402	IndiaRice2	181402	IndiaRice2
181403	IndiaRice3	181403	IndiaRice3	181403	IndiaRice3	181403	IndiaRice3
181501	IndiaSoybean1	181501	IndiaSoybean1	181501	IndiaSoybean1	181501	IndiaSoybean1
181901	IndiaTomato1	181901	IndiaTomato1	181901	IndiaTomato1	181901	IndiaTomato1
190501	IndonesiaCocoa1	190501	IndonesiaCocoa1	190501	IndonesiaCocoa1	190501	OUT

190502	IndonesiaCocoa2	190502	IndonesiaCocoa2	190502	OUT	190502	OUT
190701	IndonesiaMaize1	190701	IndonesiaMaize1	190701	IndonesiaMaize1	190701	IndonesiaMaize1
190702	IndonesiaMaize2grain	190702	IndonesiaMaize2grain	190702	IndonesiaMaize2	190702	IndonesiaMaize2
		197102	IndonesiaMaize2silage				
191401	IndonesiaRice1	191401	IndonesiaRice1	191401	IndonesiaRice1	191401	IndonesiaRice1
191402	IndonesiaRice2	191402	IndonesiaRice2	191402	IndonesiaRice2	191402	IndonesiaRice2
200301	ItalyBarley1	200301	ItalyBarley1	200301	ItalyBarley1	200301	ItalyBarley1
200302	ItalyBarley2	200302	ItalyBarley2	200302	ItalyBarley2	200302	ItalyBarley2
200303	ItalyBarley3	200303	ItalyBarley3	200303	ItalyBarley3	200303	ItalyBarley3
200901	ItalyGrape1	200901	ItalyGrape1	200901	ItalyGrapes1	200901	ItalyGrapes1
200902	ItalyGrape2	200902	ItalyGrape2	200902	ItalyGrapes2	200902	ItalyGrapes2
200903	ItalyGrape3	200903	ItalyGrape3	200903	ItalyGrapes3	200903	ItalyGrapes3
201901	ItalyTomato1	201901	ItalyTomato1	201901	ItalyTomato1	201901	ItalyTomato1
201902	ItalyTomato2	201902	ItalyTomato2	201902	ItalyTomato2	201902	ItalyTomato2
202101	ItalyWheat1	202101	ItalyWheat1	202101	ItalyWheat1	202101	ItalyWheat1
202102	ItalyWheat2	202102	ItalyWheat2	202102	ItalyWheat2	202102	ItalyWheat2
202103	ItalyWheat3	202103	ItalyWheat3	202103	ItalyWheat3	202103	ItalyWheat3
207201	ItalyMaize1grain	207201	ItalyMaize1grain	207201	ItalyMaize1grain	207201	ItalyMaize1grain
207101	ItalyMaize1silage	207101	ItalyMaize1silage				
210501	IvoryCoastCocoa1	210501	IvoryCoastCocoa1	210501	IvoryCoastCocoa1	210501	IvoryCoastCocoa1
221301	JapanPotato1	221301	JapanPotato1	221301	JapanPotato1	221301	JapanPotato1
221302	JapanPotato2	221302	JapanPotato2	221302	JapanPotato2	221302	JapanPotato2
221303	JapanPotato3	221303	OUT	221303	OUT	221303	OUT
231901	JordanTomato1	231905	JordanTomato1+3	231905	OUT	231905	OUT
231903	JordanTomato3						
231902	JordanTomato2	231902	JordanTomato2	231902	OUT	231902	OUT

231904	JordanTomato4	231904	OUT	231904	OUT	231904	OUT
241301	KenyaPotato1	241301	KenyaPotato1	241303	KenyaPotato1+2	241303	KenyaPotato1+2
241302	KenyaPotato2	241302	KenyaPotato2				
241901	KenyaTomato1	241901	KenyaTomato1	241903	KenyaTomato1+2	241903	KenyaTomato1+2
241902	KenyaTomato2	241902	KenyaTomato2				
242101	KenyaWheat1	242101	KenyaWheat1	242101	OUT	242101	OUT
242102	KenyaWheat2	242102	KenyaWheat2	242102	OUT	242102	OUT
261401	MalaysiaRice1	261401	MalaysiaRice1	261401	MalaysiaRice1	261401	MalaysiaRice1
270701	MexicoMaize1	270721	MexicoMaize1	270721	MexicoMaize1	270723	MexicoMaize1+2
		270711	MexicoSilage1				
270702	MexicoMaize2	270722	MexicoMaize2	270722	MexicoMaize2		
		270712	MexicoSilage2				
271301	MexicoPotato1	271301	MexicoPotato1	271301	MexicoPotato1	271301	MexicoPotato1
271701	MexicoSugarcane1	271701	MexicoSugarcane1	271701	MexicoSugarcane1	271701	OUT
271901	MexicoTomato1	271901	MexicoTomato1	271901	MexicoTomato1	271901	MexicoTomato1
280701	MoroccoMaize1+2	280721	MoroccoMaize1+2	280721	OUT	280721	OUT
		280711	MoroccoSilage1+2	280711	OUT	280711	OUT
281301	MoroccoPotato1+2	281301	MoroccoPotato1+2	281301	MoroccoPotato1+2	281301	MoroccoPotato1+2
281901	MoroccoTomato1	281901	OUT	281901	OUT	281901	OUT
282101	MoroccoWheat1+2	282101	MoroccoWheat1+2	282101	MoroccoWheat1+2	282101	MoroccoWheat1+2
290101	TheNetherlandsApples1	290101	TheNetherlandsApples1	290101	NetherlandsApple1	290101	NetherlandsApple1
291101	TheNetherlandsPear1	291101	TheNetherlandsPear1	291101	NetherlandsPear1	291101	NetherlandsPear1
302101	PakistanWheat1	302101	PakistanWheat1	302101	PakistanWheat1	302101	PakistanWheat1
310701	ParaguayMaize1	317201	ParaguayMaize1	317201	ParaguayMaize1	317203	ParaguayMaize1+2
		317101	ParaguyaSilage				
310702	ParaguayMaize2	310702	ParaguayMaize2	310702	ParaguayMaize2		

311501	ParaguaySoybean1	311501	ParaguaySoybean1	311501	ParaguaySoybean1	311503	ParaguaySoybean1+2
311502	ParaguaySoybean2	311502	ParaguaySoybean2	311502	ParaguaySoybean2		
321301	PeruPotato1	321301	PeruPotato1	321301	PeruPotato1	321301	PeruPotato1
327201	PeruMaize1grain	327201	PeruMaize1grain	327201	PeruMaize1	327201	PeruMaize1
327101	PeruMaize1silage	327101	PeruMaize1silage				
3314101	PhilippinesRice1dry	3314101	PhilippinesRice1dry	3314101	OUT	3314101	OUT
3314102	PhilippinesRice2dry	3314102	PhilippinesRice2dry	3314102	PhilippinesRice2dry	3314102	PhilippinesRice2dry
3314103	PhilippinesRice3dry	3314103	PhilippinesRice3dry	3314103	PhilippinesRice3dry	3314103	PhilippinesRice3dry
3314201	PhilippinesRice1wet	3314201	PhilippinesRice1wet	3314201	OUT	3314201	OUT
3314202	PhilippinesRice2wet	3314202	PhilippinesRice2wet	3314202	PhilippinesRice2wet	3314202	PhilippinesRice2wet
3314203	PhilippinesRice3wet	3314203	PhilippinesRice3wet	3314203	PhilippinesRice3wet	3314203	PhilippinesRice3wet
						340301	PolandBarley1
350701	RussiaMaize1	357203	RussiaMaize1+2grain	357203	RussiaMaize1+2	357203	RussiaMaize1+2
350702	RussiaMaize2	357103	RussiaMaize1+2silage				
351801	RussiaSunflowerSeed1	351803	RussiaSunflowerSeed1+2	351803	RussiaSunflowerseed1+2	351803	RussiaSunflowerseed1+2
351802	RussiaSunflowerSeed2						
360701	SouthafricaMaize1	360701	SouthafricaMaize1	360701	OUT	360701	OUT
		360722	SouthafricaMaize2	360722	OUT	360722	OUT
		360712	SouthafricaMaize2silage	360712	OUT	360712	OUT
		360703	SouthafricaMaize3	360703	OUT	360703	OUT
		360704	SouthafricaMaize4	360704	OUT	360704	OUT
361301	SouthafricaPotato1	361301	SouthafricaPotato1	361301	OUT	361301	OUT
		361302	SouthafricaPotato2	361302	OUT	361302	OUT
370301	SpainBarley1	370301	SpainBarley1	370301	SpainBarley1	370301	SpainBarley1
371201	SpainPepper1	371201	SpainPepper1	371201	SpainPepper1	371201	SpainPepper1
371801	SpainSunflowerSeed1	371801	SpainSunflowerSeed1	371801	SpainSunflowerseed1	371801	SpainSunflowerseed1

371902	SpainTomato2	371902	SpainTomato2	371902	SpainTomato2	371902	SpainTomato2
		371601	SpainStonefruit1	371601	SpainStonefruit1	371601	SpainStonefruit1
3914101	ThailandRice1dry	3914103	ThailandRice1+2dry	3914103	ThailandRice1+2dry	3914103	OUT
3914102	ThailandRice2dry						
3914201	ThailandRice1wet	3914203	ThailandRice1+2wet	3914203	ThailandRice1+2wet	3914203	ThailandRice1+2wet
3914202	ThailandRice2wet						
400701	UkraineMaize1	400701	UkraineMaize1	400701	UkraineMaize1	400701	UkraineMaize1
400702	UkraineMaize2	400702	UkraineMaize2	400702	UkraineMaize2	400702	UkraineMaize2
401801	UkraineSunflowerSeed1	401801	UkraineSunflowerSeed1	401801	UkraineSunflowerseed1	401801	UkraineSunflowerseed1
401802	UkraineSunflowerSeed2	401802	UkraineSunflowerSeed2	401802	UkraineSunflowerseed2	401802	UkraineSunflowerseed2
401803	UkraineSunflowerSeed3	401803	UkraineSunflowerSeed3	401803	UkraineSunflowerseed3	401803	UkraineSunflowerseed3
420701	VenezuelaMaize1	420721	VenezuelaMaize1	420721	VenezuelaMaize1	420721	OUT
		420711	VenezuelaMaize1silage				
420702	VenezuelaMaize2	420702	VenezuelaMaize2	420702	VenezuelaMaize2	420702	OUT
430601	VietnamCoffee1	430603	VietnamCoffee1+2	430603	VietnamCoffee 1+2	430603	VietnamCoffee 1+2
430602	VietnamCoffee2						
430701	VietnamMaize1	430701	VietnamMaize1	430701	VietnamMaize1	430701	VietnamMaize1
430702	VietnamMaize2	430702	VietnamMaize2	430702	VietnamMaize2	430702	VietnamMaize2
440701	ZambiaMaize1	440701	ZambiaMaize1	440704	ZambiaMaize1+2+3	440704	ZambiaMaize1+2+3
440702	ZambiaMaize2	440702	ZambiaMaize2				
440703	ZambiaMaize3	440703	ZambiaMaize3				
450301	UKBarley1	450301	UKBarley1	450301	UKBarley1	450301	UKBarley1
460301	GermanyBarley1	460301	GermanyBarley1	460301	GermanyBarley1	460301	GermanyBarley1
		470301	TanzaniaBarley1	470301	OUT	470301	OUT
				470701	TanzaniaMaize1	470701	TanzaniaMaize1
				471901	TanzaniaTomato1	471901	TanzaniaTomato1

				480701	ZimbabweMaize1	480701	ZimbabweMaize1
						490301	CzechBarley1
			TOTAAL	**143**	**143**	**118**	**118**