What makes GYGA a unique data source?

1. Global Protocol for High Quality & Locally Relevant Yield Data

GYGA data is collected by following a "bottom-up" global protocol to organise soil, climate, and cropping system data to ensure local relevance. The protocol implements a levelled approach for data collection, with a preference for use of primary data.

Furthermore, the use of local knowledge of local agronomists, GYGA ensures high quality and local relevance in the data it offers.

2. Results Are Available at Different Spatial Levels

GYGA results are currently available at three spatial levels: 1) Weather stations, 2) Climate zones, 3) National.

3. Scientific Credibility Over the Years

GYGA has established scientific credibility since it was founded as its methods and applications have resulted in dozens of well-cited scientific publications.

WANT TO EXTEND GYGA'S BENEFITS TO YOUR ORGANISATION?

Learn more about GYGA license and sponsorship subscription. Our current subscribers include Yara, Bill & Melinda Gates Foundation, and a number of world’s leading agro-inputs, biostimulant, and management consultancy companies.

Got questions or see scope of partnership? Contact us at gyga.support@wur.nl.

www.yieldgap.org
70 COUNTRIES

are current being covered in GYGA across all continents (Africa, Asia, Oceania, Americas, Europe).

AVERAGE ANNUAL WEBSITE VISITS 60,000

19,000 AVERAGE DATA DOWNLOADS over the past five years

Check out www.yieldgap.org to explore how GYGA could support your decision on crop cultivation!
GLOBAL YIELD GAP ATLAS (GYGA)

HOW OUR USERS BENEFIT FROM GYGA
WWW.YIELDGAP.ORG

MARKET IDENTIFICATION & INVESTMENT PRIORITISATION
“What are the areas in a country or the world where your product or investment could achieve the highest return on investment?” Use GYGA data to strengthen your market identification and prioritisation of your investment. Field trials, and scaling out of your innovation.

HIGH QUALITY AND LOCALLY-RELEVANT YIELD DATA SOURCE
GYGA uses a ‘bottom up’ approach, which means that it uses locally collected data by country agronomists to ensure local relevance for your decision making. The data are available at national, climate zone, and weather station levels.

BENCHMARKING FOR CROP MODELLING
The high quality and locally-relevant yield gap, potential yield and resource use efficiency data offered by GYGA has been used as benchmarking for crop production and agri-tech innovations.

IMPACT ASSESSMENT OF YOUR INVESTMENT IN AGRICULTURE
Measure the impact of your investment by monitoring progress of indicators such as yield gap closure or water productivity. Since 2019, an indicator called Yield Gap Closure, based on GYGA, has been included for the assessment of SDG2 by the UN-SDSN.

YIELD GAP, FOOD SECURITY, LAND USE ANALYSIS
GYGA has been used as a starting point to understand the causes of yield gaps and to undertake research on how to close the yield gap in practice. GYGA data is also used for strategic food security and land use analyses.

Get on board on our journey towards a climate- positive food future through data-driven agronomy! Got questions or see scope for partnership? Contact us at gyga.support@wur.nl
GYGA protocol – Bottom-up approach for data collection

**STEP 1 Identify the target crop**
- For relatively large countries, only crops with total national harvested area of >100,000 ha are evaluated in GYGA separately for irrigated and rainfed conditions.
- For smaller countries and crops with <100,000 ha are evaluated in GYGA.

**STEP 2 Identify the areas in a country in which the target crop is grown, using the SPAM crop mask (You et al., 2020)**

**STEP 3 Identification of key climate zones where the crop is grown**
- Climate zones are defined by growing degree days, temperature, humidity, and aridity index.
- Within a country, identify C2s with >5% of total national harvested crop area for the crop/water regime (irrigated or rainfed) in question. These C2s are the “designated” C2s (DC2s) for yield gap assessment of that crop and water regime in that country.
- The selected DC2s typically contain more than 50% of national crop area except in a few cases.

**STEP 4 Selection of weather station points**
- Selected weather stations can either be existing points where a weather station exists with long-term weather data of adequate quality for yield gap assessment, or a hypothetical weather station location in cases where there is large crop area but without existing weather station coverage. The selected stations are called reference weather stations (RWS).
- Criteria:
  - ≥5% of total area within their buffer zone
  - Select weather stations with the highest harvested area, re-rank, and so forth until total harvested area in buffer zones of selected weather stations reaches 50% of total national harvested crop area.

**STEP 5 Collecting weather data at points level**
- Source of weather data:
  1. Preference 1: Long-term (10-20 years) observed daily weather data (Tmax, Tmin, humidity, precipitation and solar radiation) from a reference weather station within buffer zone. The number of years must be in the upper range of years for locations with highly variable rainfall.
  2. Preference 2: If less than 10 years observed weather data (minimum of one complete year, preferably 3-5 years) use these data to correct long-term NASA POWER data and retrieve precipitation data from TRMM or NASA POWER databases.

**STEP 6 Identify soil types and cropping systems**
- Select dominant soil types and cropping systems in harvested crop area within buffer zones (just expert opinion of country agronomists).
- Sources of soil data for rainfall crop database, both density effective rooting depth, climate,
- Select soil classes until achieving 50% crop area coverage of crop harvested area within a buffer zone.
- Verify with expert knowledge from GYGA country agronomists and GYGA team members.
- Sources of cropping system classes of crops per year, soil type, climate, effective rooting depth, and so forth until total harvested area in buffer zones of selected weather stations reaches 50% of total national harvested crop area.

**STEP 7 Determine actual yields (Ya)**
- Required timeline:
  - Irrigated crops: 5-10 years
  - Rainfed: 3-5 years
- Sources of actual yield data:
  - Preference 1: High-quality sub-national data (country, district, village, municipality level)
  - Preference 2: Observed yields in areas with highest crop densities e.g. surveys by GYGA, World Bank, research projects with on-farm yield data
  - Preference 3: Targeted survey conducted by GYGA agronomists
  - Preference 4: SPAM data

**STEP 8 Simulation of irrigated potential yield (Yp) or rainfed potential yield (Yw)**
- Yp and/or Yw will be simulated for each cropping system x soil type x RWS (CASA/SPAM).
- Estimated Yp and Yw values are up-scaled from RWS to the C2 level by weighting for the proportion of harvested area for each RWS x Soil x C2 combination.
- Results at C2 level are used to upscale to the national level by weighting for the proportion of harvested area for each C2 based on SPAM crop mask.

**STEP 9 Calculation of yield gap (YG)**
- The years for which we simulated Yp or Yw and for which YG estimations are available may not match and therefore we calculate YG as an average value based on average Yp or Yw at each spatial scale and the associated average value of Ya.
- If Ya is only available at a national level, YG will be estimated by a single value of Ya and will vary only to the extent that Yp or Yw vary at different spatial scales, from the C2, to administrative units and nation.