Global Harvested Area and Yield for 175 Crops

Metadata and Technical Documentation

Abstract:

Croplands cover ~15 million km2 of the planet and provide the bulk of the food and fiber essential to human well-being. Most global land cover data sets from satellites group croplands into just a few categories, thereby excluding information that is critical for answering key questions ranging from biodiversity conservation to food security to biogeochemical cycling. Information about agricultural land use practices like crop selection, yield, and fertilizer use is even more limited. Here we present land use data sets created by combining national, state, and county level census statistics with a recently updated global data set of croplands on a 5 minute by 5 minute (~10 km by 10 km) latitude/longitude grid. The resulting land use data sets depict circa the year 2000 the area (harvested) and yield of 175 distinct crops of the world.

Citation:

Monfreda, C., N. Ramankutty, and J. A. Foley (2008), Farming the planet: 2. Geographic distribution of crop areas, yields, physiological types, and net primary production in the year 2000, Global Biogeochem. Cycles, 22, GB1022, doi:10.1029/2007GB002947.

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Data Products:

The following data products are included for each of 175 crops:

- Harvested Area: fractional
  - Crop-specific data representing the average fractional proportion of a gridcell that was harvested in a crop during the 1997-2003 era.
- Harvested Area: hectares
  - Crop-specific data representing the average number of hectares harvested per land-area of a gridcell during the 1997-2003 era
- Yield : tons per hectare
  - Crop-specific data representing the average yield for a crop in tons per hectare during the 1997-2003 era
- Production: tons
  - Total crop production in metric tons on the land-area mass of a gridcell. Harvested area in hectares was multiplied by yield per hectare to create this data product.
- Data Quality for harvested area and yield
  - These products represent the agricultural census data quality for harvested area and yield for each crop.
    - Data quality categories:
      - Value of 1: county level census data
      - Value of 0.75: state level census data
      - Value of 0.5: interpolated with census data from within 2 degrees latitude/longitude
      - Value of 0.25: country level census data
      - Value of 0: missing census data

Formats:

All data are provided in the following formats:

- .tif : Geotiff (More information: http://trac.osgeo.org/geotiff/)
- .nc : NetCDF (More information: http://www.unidata.ucar.edu/software/netcdf/)
- .asc : ARC/INFO ASCII GRID (More information: http://en.wikipedia.org/wiki/Esri_grid)
- .fgdb : Esri File Geodatabase (More information: http://www.esri.com/software/arcgis/geodatabase/)
- .kmz : Google Earth (Download Google Earth free: http://www.google.com/earth/index.html)

Resolution:

- Spatial: Five minute by five minute resolution (~10km x 10km at equator)
- Temporal: Year 2000 - Average of census data between 1997-2003

Map Projection:

- Data presented as five-arc-minute, 4320 x 2160 cell grid
- Spatial Reference: GCS_WGS_1984
- Datum: D_WGS_1984
- Cell size: 0.083333 degrees
- Layer extent:
    - Top : 90
    - Left: -180
    - Right: 180
    - Bottom: -90

Methods:

- See page 10 of included 'Monfreda_etal2008CropDistYld.pdf' for complete discussion of technical methods.
- See page 5 of Monfreda et al. 2008 for information on sub-national statistics by country.

Agricultural Inventory Data:

We collected agricultural census and survey information on the areas and yields of 175 crops from the smallest political units reasonably obtainable for 206 countries. Data availability varied for different crops within each country, with most countries having subnational statistics for some crops but national statistics for others. Subnational data are one or two administrative levels below the national (i.e., state/province and county/district). These include 2299 political units one level below the national from 150 countries, and 19,751 units two levels below for 73 countries. The largest single source of subnational data is Agro-MAPS, a joint project between the United Nations Food and Agriculture Organization (FAO), the International Food Policy Research Institute (IFPRI), and the Center for Sustainability and the Global Environment (SAGE).

Agro-MAPS is a collection of subnational statistics on crop area, production, and yield for most countries in the world. For some crops, however, the Agro-MAPS data was missing or insufficiently detailed. To cover these gaps, we collected additional data from national census agencies and agricultural surveys. In particular, we turned to additional censuses and surveys to ensure county level data for the largest countries, including Brazil, Argentina, Mexico, Canada, India, the United States, and China. In certain instances we were only able to obtain subnational information on major crop groups (e.g., fruits or vegetables), which we used to proportionally distribute national level data from FAO to the state or county level.

When subnational statistics were unavailable, we relied on national figures from the Food and Agriculture Organization's statistical databases [FAO, 2006a]. We collected independent national level data for four countries that were absent from FAO: Afghanistan, Iraq, Somalia, and Taiwan.

Frequently Asked Questions and Tips:

- Why does the harvested area fraction exceed 1 (100% or more of a cell in a single crop)?
    - A grid cell may be more than 1.0 or 100% due to multiple harvests per year. For example, if a crop is produced in 60% of the grid cell's area, and harvested twice in one year, that cell would have a value of 1.2, or 120%.
- These data sets are not intended to be interpreted at the individual grid cell level. Although it is presented at five-minute resolution, the best way to use these maps is to compare counties, states, regions, countries, or continents.
- Due to the nature of agricultural statistics, the major crops are also more reliable than the minor crops. In other words, be more careful when using bambara or broccoli data than when using wheat or maize data.
- Updates to include historical and more recent data are currently in progress. While agriculture has changed drastically in the past decade, we believe that these data represent the more complete and detailed source of spatial agricultural systems in existence.

See next page for crop name and group information

EarthStat and FAO crop names and crop groups

CROPNAME	Cropname_FAO	GROUP
abaca	Manila Fibre (Abaca)	Fiber
agave	Agave Fibres Nes	Fiber
alfalfa	alfalfa	Forage
almond	Almonds, with shell	Treenuts
aniseetc	Anise, badian, fennel, corian.	OtherCrops
apple	Apples	Fruit
apricot	Apricots	Fruit
areca	Arecanuts	OtherCrops
artichoke	Artichokes	Vegetables&Melons
asparagus	Asparagus	Vegetables&Melons
avocado	Avocados	Fruit
bambara	Bambara beans	Pulses
banana	Bananas	Fruit
barley	Barley	Cereals
bean	Beans, dry	Pulses
beetfor	beetfor	Forage
berrynes	Berries Nes	Fruit
blueberry	Blueberries	Fruit
brazil	Brazil nuts, with shell	Treenuts
broadbean	Broad beans, horse beans, dry	Pulses
buckwheat	Buckwheat	Cereals
cabbage	Cabbages and other brassicas	Vegetables&Melons
cabbagefor	cabbagefor	Forage
canaryseed	Canary seed	Cereals
carob	Carobs	Fruit
carrot	Carrots and turnips	Vegetables&Melons
carrotfor	carrotfor	Forage
cashew	Cashew nuts, with shell	Treenuts
cashewapple	Cashewapple	Fruit
cassava	Cassava	Roots&Tubers
castor	Castor oil seed	Oilcrops
cauliflower	Cauliflowers and broccoli	Vegetables&Melons
cerealnes	Cereals, nes	Cereals
cherry	Cherries	Fruit
chestnut	Chestnuts	Treenuts
chickpea	Chick peas	Pulses

chicory	Chicory roots	OtherCrops
chilleetc	Chillies and peppers, green	Vegetables&Melons
cinnamon	Cinnamon (canella)	OtherCrops
citrusnes	Citrus fruit, nes	Fruit
clove	Cloves	OtherCrops
clover	clover	Forage
cocoa	Cocoa beans	OtherCrops
coconut	Coconuts	Oilcrops
coffee	Coffee, green	OtherCrops
coir	Coir	Fiber
cotton	Seed cotton	Fiber
cowpea	Cow peas, dry	Pulses
cranberry	Cranberries	Fruit
cucumberetc	Cucumbers and gherkins	Vegetables&Melons
currant	Currants	Fruit
date	Dates	Fruit
eggplant	Eggplants (aubergines)	Vegetables&Melons
fibrenes	Fibre Crops Nes	Fiber
fig	Figs	Fruit
flax	Flax fibre and tow	Fiber
fonio	Fonio	Cereals
fornes	fornes	Forage
fruitnes	Fruit Fresh Nes	Fruit
garlic	Garlic	Vegetables&Melons
ginger	Ginger	OtherCrops
gooseberry	Gooseberries	Fruit
grape	Grapes	Fruit
grapefruitetc	Grapefruit (inc. pomelos)	Fruit
grassnes	grassnes	Forage
greenbean	Beans, green	Vegetables&Melons
greenbroadbean	Leguminous vegetables, nes	Vegetables&Melons
greencorn	Maize, green	Vegetables&Melons
greenonion	Onions (inc. shallots), green	Vegetables&Melons
greenpea	Peas, green	Vegetables&Melons
groundnut	Groundnuts, with shell	Oilcrops
gums	Gums Natural	OtherCrops
hazelnut	Hazelnuts, with shell	Treenuts
hemp	Hemp Tow Waste	Fiber
hempseed	Hempseed	Oilcrops
hop	Hops	OtherCrops

jute	Jute	Fiber
jutelikefiber	Other Bastfibres	Fiber
kapokfiber	Kapok Fibre	Fiber
kapokseed	Kapokseed in Shell	Fiber
karite	Karite Nuts (Sheanuts)	Oilcrops
kiwi	Kiwi fruit	Fruit
kolanut	Kolanuts	OtherCrops
legumenes	legumenes	Forage
lemonlime	Lemons and limes	Fruit
lentil	Lentils	Pulses
lettuce	Lettuce and chicory	Vegetables&Melons
linseed	Linseed	Oilcrops
lupin	Lupins	Pulses
maize	Maize	Cereals
maizefor	maizefor	Forage
mango	Mangoes, mangosteens, guavas	Fruit
mate	MatŽ	OtherCrops
melonetc	Other melons (inc.cantaloupes)	Vegetables&Melons
melonseed	Melonseed	Oilcrops
millet	Millet	Cereals
mixedgrain	Mixed grain	Cereals
mixedgrass	mixedgrass	Forage
mushroom	Mushrooms and truffles	Vegetables&Melons
mustard	Mustard seed	Oilcrops
nutmeg	Nutmeg, mace and cardamoms	OtherCrops
nutnes	Nuts, nes	Treenuts
oats	Oats	Cereals
oilpalm	Oil palm fruit	Oilcrops
oilseedfor	oilseedfor	Forage
oilseednes	Oilseeds, Nes	Oilcrops
okra	Okra	Vegetables&Melons
olive	Olives	Oilcrops
onion	Onions, dry	Vegetables&Melons
orange	Oranges	Fruit
papaya	Papayas	Fruit
pea	Peas, dry	Pulses
peachetc	Peaches and nectarines	Fruit
pear	Pears	Fruit
pepper	Pepper (Piper spp.)	OtherCrops
peppermint	Peppermint	OtherCrops

persimmon	Persimmons	Fruit
pigeonpea	Pigeon peas	Pulses
pimento	Chillies and peppers, dry	OtherCrops
pineapple	Pineapples	Fruit
pistachio	Pistachios	Treenuts
plantain	Plantains	Fruit
plum	Plums and sloes	Fruit
popcorn	Popcorn	Cereals
poppy	Poppy seed	Oilcrops
potato	Potatoes	Roots&Tubers
pulsenes	Pulses, nes	Pulses
pumpkinetc	Pumpkins, squash and gourds	Vegetables&Melons
pyrethrum	Pyrethrum,Dried	OtherCrops
quince	Quinces	Fruit
quinoa	Quinoa	Cereals
ramie	Ramie	Fiber
rapeseed	Rapeseed	Oilcrops
rasberry	Raspberries	Fruit
rice	Rice, paddy	Cereals
rootnes	Roots and Tubers, nes	Roots&Tubers
rubber	Natural rubber	OtherCrops
rye	Rye	Cereals
ryefor	ryefor	Forage
safflower	Safflower seed	Oilcrops
sesame	Sesame seed	Oilcrops
sisal	Sisal	Fiber
sorghum	Sorghum	Cereals
sorghumfor	sorghumfor	Forage
sourcherry	Sour cherries	Fruit
soybean	Soybeans	Oilcrops
spicenes	Spices, nes	OtherCrops
spinach	Spinach	Vegetables&Melons
stonefruitnes	Stone fruit, nes	Fruit
strawberry	Strawberries	Fruit
stringbean	String beans	Vegetables&Melons
sugarbeet	Sugar beet	SugarCrops
sugarcane	Sugar cane	SugarCrops
sugarnes	Sugar crops, nes	SugarCrops
sunflower	Sunflower seed	Oilcrops
swedefor	swedefor	Forage
sweetpotato	Sweet potatoes	Roots&Tubers

tangetc	Tangerines, mandarins, clem.	Fruit
taro	Taro (cocoyam)	Roots&Tubers
tea	Tea	OtherCrops
tobacco	Tobacco, unmanufactured	OtherCrops
tomato	Tomatoes	Vegetables&Melons
triticale	Triticale	Cereals
tropicalnes	Fruit, tropical fresh nes	Fruit
tung	Tung Nuts	Oilcrops
turnipfor	turnipfor	Forage
vanilla	Vanilla	OtherCrops
vegetablenes	Vegetables fresh nes	Vegetables&Melons
vegfor	vegfor	Forage
vetch	Vetches	Pulses
walnut	Walnuts, with shell	Treenuts
watermelon	Watermelons	Vegetables&Melons
wheat	Wheat	Cereals
yam	Yams	Roots&Tubers
yautia	Yautia (cocoyam)	Roots&Tubers