

Documentation for the Twentieth Century Crop Statistics, 1900-2017

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Abstract

This document outlines the methodology and data sets used to construct the Twentieth Century Crop Statistics, 1900-2017, along with limitations, and use constraints. It consists of national or subnational maize and wheat production, yield, and harvested area statistics for all available years from 1900-2017. The Twentieth Century Crop Statistics combines a new digitization of crop statistics from Italy, Spain, Indonesia, China, Mexico, Uruguay, Chile, Sweden, and Morocco with existing, publicly available, digitized data sets from India, Australia, the United States, Canada, Southern Brazil, Argentina, England, Austria, Belgium, Croatia, Czech Republic, Finland, Germany, Spain, Portugal, France, the Netherlands, and South Africa. The data provides a unique crop yield data set that spans the twentieth century for many of the world's major bread baskets.

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We appreciate feedback regarding this data set, such as suggestions, discovery of errors, difficulties in using the data, and format preferences. Please contact:

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I. Introduction

This document outlines the methodology and data sets used to construct the Twentieth Century Crop Statistics, 1900–2017, and consists of national or subnational maize and wheat production, yield, and harvested area statistics for all available years from 1900–2017.

II. Data and Methodology

Input data

Data for maize and wheat yield, harvest area, and production were collated from publicly available sources and previously published data sets, with additional data digitization conducted for strategic crop regions. All data are reported in tonnes for production, hectares for harvested area, and tonnes/hectare for yield. The data set contains two year variables: “Harvest_year” corresponds to the year in which the crop is harvested, while “year” corresponds to the reporting year from the original data. The two are different in cases in which the original data are reported for the harvest year. All political boundaries for statistical reporting are for the year 2010 unless stated otherwise.

South America

Crop statistics in Brazil are provided by the Brazilian Institute of Geography and Statistics (IBGE), available at:

- <https://sidra.ibge.gov.br/geratabela/DownloadSelecaoComplexa/-443988984>
- <https://sidra.ibge.gov.br/geratabela/DownloadSelecaoComplexa/-1810039273>.

Data from before 1974 are compiled from IBGE Yearbooks, which are not available online.

Argentinian crop statistics are provided by the Ministry of Agriculture, Fisheries and Food. Data from the 1969/1970 cropping cycle to the present are available online at the Estadísticas Agrícolas web site of the Ministry at:

- <https://datos.agroindustria.gob.ar/dataset/estimaciones-agricolas>

Data prior to 1969 were obtained from the same Ministry but are not available online.

Crop statistics in Uruguay are all from the Ministry of Agriculture and Fisheries. Data prior to 2010 were obtained from the Office of Agricultural Statistics (DIEA) website of historical data:

- <https://www.gub.uy/ministerio-ganaderia-agricultura-pesca/datos-y-estadisticas/datos>

Data for post 2010 were obtained from the Annual Statistics of the same office. E.g., for 2019:

- <https://descargas.mgap.gub.uy/DIEA/Anuarios/Anuario2019/Anuario2019.pdf>

Data in Chile are sourced from the Chilean Oficina de Estudios y Políticas Agrarias (ODEPA) and the Instituto Nacional de Estadísticas (INE), and were provided by Dr. Alejandro Del Pozo Lira.

North America

Data for the United States were downloaded at administrative level 1 from The United States Department of Agriculture (USDA), National Agricultural Statistics Service (NASS):

- <https://quickstats.nass.usda.gov/>

Data for wheat were downloaded in three separate crop types: one general “wheat” category, as well as “spring wheat” and “winter wheat”. All three crops are provided in the data set.

Canada

- Crop statistics in Canada were downloaded from Statistics Canada forms M249-293 (<https://www150.statcan.gc.ca/n1/pub/11-516-x/sectionm/4057754-eng.htm>) which sources its data for 1921 to 1974 from Statistics Canada, Handbook of Agricultural Statistics: Field Crops, part I, (Catalogue 21-516)
- 1908 to 1920, Canada, Dominion Bureau of Statistics, Handbook of Agricultural Statistics: Field Crops, part I, (Catalogue 21-507)
- 1911 to 1915, Canada, Department of Trade and Commerce, Census and Statistics Office, Census and Statistics Monthly
- 1900, Canada, Dominion Bureau of Statistics, Sixth Census of Canada, 1921: Agriculture, vol. V
- 1890, same as for 1900
- 1890 to 1910, Canada, Department of Trade and Commerce, Census and Statistics Office, Fifth Census of Canada, 1911: Agriculture, vol. IV.
- 1880, Canada, Department of Agriculture, Census Branch, Census of Canada, 1880-81, vol. III
- 1870, Canada, Department of Agriculture, Census Branch, Census of Canada, 1870-71, vol. III. M294-300, for 1916 to 1974, Statistics Canada, Quarterly Bulletin of Agricultural Statistics, (Catalogue 21-003)

Crop statistics in Mexico are from the National Institute of Statistics and Geography (INEGI) publication Estadísticas Históricas de México 2014. (2015), Chapter 9.

Asia and Australia

Crop statistics for Australia were downloaded from the Australian Bureau of Statistics (ABS). The ABS data has been sourced from ABS publications, including ABS Yearbooks, State Statistical Summaries and Agricultural Commodities.

The crop statistics for Indonesia are for Java and Madura, digitized from Van der Eng (1996), which collates the statistics from Statistisch Jaaroverzicht voor Nederlandsch-Indië (1922-1930), Indisch Verslag (1931-1941), and Geoogste Uitgestrektheden en Productie van de Voornaamste Voedingsgewassen op Java en Madoera (1937-1946).

More recent data can be downloaded from the Bureau of Statistics of Indonesia (BPS) website.

The estimates for crop statistics in India are from Kurosaki (2011), who derived them from those of Sivasubramonian (2000) and Blyn (1966). The original data is from the *Agricultural Statistics of India* and *Estimates of Area and Production of India* published by the colonial government and from the Report on the Season and Crops issued by each province, which was compiled by Kurosaki. After 1961, the data are supplied by the Food and Agriculture Organization Corporate Statistical Database (FAOSTAT, <https://www.fao.org/faostat/en/#home>). While Kurosaki provides subnational crop statistics estimates, only country-level estimates were chosen due to concerns of missing data at the subnational level and shifting administrative boundaries.

The estimates of crop statistics in China from 1930-1949 originates from a series of national statistics publications, including The Republic of China Agricultural and Commercial Statistics Table (Nine Volumes), Four volumes of the Republic of China Statistics, China's Modern Agriculture and Trade Statistics, and China Economic Yearbook Volume I, 1948 Republic of China Statistical Yearbook. Data after 1949 are from the Ministry of Agriculture at:

- <http://www.agri.cn/> specifically <http://ncpscxx.moa.gov.cn/product-web/#/queryDataMain/agriculturalStatistics?item=3&id=4>

Wheat data is for spring and winter wheat combined, as disaggregated statistics were only available after 1980. Due to changes in the boundaries of provinces, two sets of provinces were grouped together to maintain more consistent geographic boundaries of reporting units over time. The first group consisted of Hebei, Jehol, Liaoning, Jilin, Heilongjiang, Suiyuan, and Chahar prior to 1949 and Hebei, Beijing, Tianjin, Liaoning, Jilin, Heilongjiang, and Neimenggu after 1949. The second group consisted of Xizang, Chuanbian, and Sichuan prior to 1949 and Xizang, Sichuan, and Chongqing Shi after 1949. Finally, after 1949, the Gansu province was combined with Ningxia to better match the pre-1949 Gansu boundary.

Africa

In Morocco, crop statistics were only available as total cereals, although the yield of total cereals closely tracks that for wheat over the Food and Agriculture Organization (FAO) reporting period. Data in Morocco for 1938-1979 were available from Jouve (1980). Data for 1980-2017 were downloaded from FAOSTAT. Only total cereals were used from FAOSTAT to maintain consistency between the two data sources as much as possible.

Crop statistics for South Africa were downloaded from the South African Grain Information Service:

- <https://www.sagis.org.za/historic%20whole%20grain%20info.html>.

Europe

France:

The full data set of French crop yields is described in Schauburger et al. (2022) and is available from <https://dataservices.gfz-potsdam.de/pik/showshort.php?id=9fed9402-ceaf-11eb-9603-497c92695674>. The original source data was compiled from the following sources:

- 1900-1957 is from the Ministère de l'agriculture, France; Statistique Agricole Annuelle 1900-1957, Imprimerie Nationale. ISSN:1962-5731
- 1958-1972 is from the Ministère de l'agriculture, France, Statistique Agricole 1958-1972, Imprimerie Nationale. ISSN:0243-6825
- 1973-1988 is from the Service Central des Enquetes et Etudes Statistiques, Ministère de l'agriculture, France; Annuaire de Statistique Agricole, Résultats Provisoires, SCEES, Tomes I, II. ISSN:0243-6825
- Data for 1989-2016 is from the Service de la Statistique et de la Prospective (SSP), Secrétariat Général du Ministère de l'Agriculture, de l'Agroalimentaire et de la Forêt (MAAF), Agreste. <https://agreste.agriculture.gouv.fr/agreste-web/>
- For full year-by-year detailed metadata, see Schauburger et al., (2018). Data is aggregated up to regions based on the 1982-2015 regional definitions. Statistical data for the years up until 2014 is reported at the administrative level 2 and aggregated up to the administrative level 1. Data for wheat is for total (spring + winter) wheat production, harvested area, or average yields.

Statistics for Spain and Portugal are from the Anuario de Estadística Agraria, published by the Ministerio de Agricultura Pesca y Alimentación. The data are available at:

- https://www.mapa.gob.es/app/biblioteca/articulos/rev_numero.asp?codrevista=AEA

The data for 1920-1929 were digitized for this data set. Data for 1929-2012 are taken from Páscoa et al., (2017), which digitizes data from the same source as that for 1920-1929. The data for Spain are reported at administrative level 2 and aggregated to administrative level 1. The data for Portugal are reported at administrative level 1 and aggregated to the national level. The data for 2013-2017 are at the administrative level 0 scale from FAOSTAT

Crop statistics for Italy are from the Annuario Agricoltura Italiana, published by the National Statistical Institute (Istat). Continuous data are digitized only for seven representative administrative level two units, and should be used with appropriate caution. These seven administrative level two units are, however, particularly agriculturally relevant, and collectively accounted for 52% and 68% of total wheat and maize production in Italy in 2010. The data are available at:

- <https://www.istat.it> and <https://www4.istat.it/it/prodotti/banche-dati/serie-storiche>

The data from 1880 to 1967 were digitized for this data set. Data from 1968 to 1990 has been collected in Istat in Rome. Data from 1991 are available in electronic form on the aforementioned website. Data are provided by local authorities that collect experts evaluations on area and yield of different crops.

Crop statistics in Austria, Belgium, Croatia, the Czech Republic, and Finland up until 2012 are from the supplemental data of Trnka et al., (2016), which is available online: https://www.int-res.com/articles/suppl/c070p195_supp/. The data after 2012 is from FAOSTAT.

Statistics on wheat in Sweden and the Netherlands were downloaded for both spring wheat and winter wheat. Data for the Netherlands are from the Central Bureau of Statistics (CBS) and are available online (CBS, 2019). Landbouw; vanaf 1851, [<https://opendata.cbs.nl>]. Centraal Bureau voor de Statistiek (CBS), Den Haag, the Netherlands. Data for Sweden before 1965 are from page 36 of the Historical Statistics of Sweden, Statistics Sweden, *Statistiska Centralbyrån (SCB)* (1959).

Table 1: Wheat statistics and data sources

Note: For the Netherlands and Sweden, statistics are available for “spring wheat” and “winter wheat” while for the U.S., it is available for “spring wheat,” “winter wheat” or “wheat”. Elsewhere wheat statistics are for spring plus winter wheat.

Country	Years	Resolution (Admin. level)	Data Sources
The United States	1866-2018	1	<ul style="list-style-type: none"> The United States Department of Agriculture (USDA), National Agricultural Statistics Service (NASS) https://quickstats.nass.usda.gov/
Canada	1908-2018	0	<ul style="list-style-type: none"> Statistics Canada https://www150.statcan.gc.ca/n1/pub/11-516-x/sectionm/4057754-eng.htm FAOSTAT https://www.fao.org/faostat/en/#home
Mexico	1897-2017	0	<ul style="list-style-type: none"> National Institute of Statistics and Geography (INEGI) FAOSTAT https://www.fao.org/faostat/en/#home
Uruguay	1900-2018	0	<ul style="list-style-type: none"> Data prior to 2010: The Ministry of Agriculture and Fisheries, Office of Agricultural Statistics (DIEA) https://www.gub.uy/ministerio-ganaderia-agricultura-pesca/datos-y-estadisticas/datos Data for post 2010 from Annual Statistics, Office of Agricultural Statistics (DIEA) https://descargas.mgap.gub.uy/DIEA/Anuarios/Anuario2019/Anuario2019.pdf

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Chile	1929-2017	0	<ul style="list-style-type: none"> Chilean Oficina de Estudios y Políticas Agrarias (ODEPA) and the Instituto Nacional de Estadísticas (INE). FAOSTAT https://www.fao.org/faostat/en/#home
Brazil	1920-2017	1	<ul style="list-style-type: none"> Instituto Brasileiro de Geografia e Estatística (IBGE). 1974-2017 available online https://sidra.ibge.gov.br/geratabela/DownloadSelec%20Complexa/-443988984 and https://sidra.ibge.gov.br/geratabela/DownloadSelec%20Complexa/-1810039273 1920-1974 are Compiled from IBGE Yearbooks
Argentina	1901-2018	0	<ul style="list-style-type: none"> Argentina Ministry of Agriculture, Fisheries and Food. Data after 1970 available online https://datos.agroindustria.gob.ar/dataset/estimaciones-agricolas
India	1902-2017	0	<ul style="list-style-type: none"> Kurosaki (2011) FAOSTAT https://www.fao.org/faostat/en/#home
China	1931/1949-2017	1	<ul style="list-style-type: none"> The Republic of China Agricultural and Commercial Statistics Table (Nine Volumes) Four volumes of the Republic of China Statistics China's Modern Agriculture and Trade Statistics China Economic Yearbook Volume I, 1948 Republic of China Statistical Yearbook. Ministry of Agriculture, available from http://www.agri.cn/, specifically http://ncpscxx.moa.gov.cn/product-web/%23/queryDataMain/agriculturalStatistics?item=3&id=4
Australia	1860-2017	1	<ul style="list-style-type: none"> Australian Bureau of Statistics (ABS) https://www.abs.gov.au/
England/United Kingdom	1885-2018	0	<ul style="list-style-type: none"> United Kingdom Department for Environment, Food and Rural Affairs https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs
Austria	1902-2017	0	<ul style="list-style-type: none"> Trnka et al., (2016), Supplemental data website: https://www.int-res.com/articles/suppl/c070p195_suppl/. FAOSTAT https://www.fao.org/faostat/en/#home
Belgium	1905-2017	0	

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Croatia	1902-2017	0	
Czech Republic	1918-2017	0	
Finland	1909-2017	0	
Spain	1920-2012 (admin 1) 2013-2017 (admin 0)	0/1	<ul style="list-style-type: none"> Ministerio de agricultura pesca y alimentación Páscoa et al. (2017) https://www.mapa.gob.es/app/biblioteca/articulos/rev_numero.asp?codrevista=AEA FAOSTAT https://www.fao.org/faostat/en/#home
Portugal	1929-2017	0	<ul style="list-style-type: none"> Páscoa et al. (2017) FAOSTAT https://www.fao.org/faostat/en/#home
France	1900-2017	1	<ul style="list-style-type: none"> Schauberger et al. (2018)
The Netherlands	1901-2017	0	<ul style="list-style-type: none"> Centraal Bureau voor de Statistiek (CBS) https://opendata.cbs.nl/
Italy	1866-2017	2	<ul style="list-style-type: none"> Annuario Agricoltura Italiana, published by the National Statistical Institute (Istat) https://www.istat.it/ and https://www4.istat.it/it/prodotti/banche-dati/serie-storiche
Sweden	1891-2017	0	<ul style="list-style-type: none"> Table E 5 and E 18 of Historik Statistik för Sverige II Väderlek, Lantmäteri, Jordbruk, Skogsbruk, Fiske Statistiska Centralbyran Statistics Sweden
Morocco	1938-2017	0	<ul style="list-style-type: none"> Jouve, A. (1980) FAOSTAT https://www.fao.org/faostat/en/#home
South Africa	1917-2017	0	<ul style="list-style-type: none"> The South African Grain Information Service https://www.sagis.org.za/historic%20whole%20grain%20info.html

Table 2: Maize statistics and data sources

Country	Years	Resolution (Admin. level)	Data Sources
The United States	1866-2018	1	<ul style="list-style-type: none"> The United States Department of Agriculture (USDA), National Agricultural Statistics Service (NASS) https://quickstats.nass.usda.gov/
Canada	1908-2018	0	<ul style="list-style-type: none"> Statistics Canada https://www150.statcan.gc.ca/n1/pub/11-516-x/sectionm/4057754-eng.htm FAOSTAT https://www.fao.org/faostat/en/#home
Mexico	1897-2017	0	<ul style="list-style-type: none"> National Institute of Statistics and Geography (INEGI). FAOSTAT https://www.fao.org/faostat/en/#home
Uruguay	1900-2018	0	<ul style="list-style-type: none"> Data prior to 2010 from the Ministry of Agriculture and Fisheries, Office of Agricultural Statistics (DIEA) https://www.gub.uy/ministerio-ganaderia-agricultura-pesca/datos-y-estadisticas/datos Data for post 2010 from Annual Statistics, Office of Agricultural Statistics (DIEA) https://descargas.mgap.gub.uy/DIEA/Anuarios/Anuario2019/Anuario2019.pdf
Chile	1929-2017	0	<ul style="list-style-type: none"> Chilean Oficina de Estudios y Políticas Agrarias (ODEPA) Instituto Nacional de Estadísticas (INE). FAOSTAT https://www.fao.org/faostat/en/#home
Brazil	1920-2017	1	<ul style="list-style-type: none"> Instituto Brasileiro de Geografia e Estatística (IBGE). 1974-2017 available online https://sidra.ibge.gov.br/geratabela/DownloadSecaoComplexa/-443988984 and https://sidra.ibge.gov.br/geratabela/DownloadSecaoComplexa/-1810039273 1920-1974 are Compiled from IBGE Yearbooks
Argentina	1901-2018	0	<ul style="list-style-type: none"> Argentina Ministry of Agriculture, Fisheries and Food. Data after 1970 available online at the Estadísticas Agrícolas web site of the Ministry: https://datos.agroindustria.gob.ar/dataset/estimaciones-agricolas

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India	1902-2017	0	<ul style="list-style-type: none"> • Kurosaki (2011) • FAOSTAT https://www.fao.org/faostat/en/#home
China	1931/1949-2017	1	<ul style="list-style-type: none"> • The Republic of China Agricultural and Commercial Statistics Table (Nine Volumes) • Four volumes of the Republic of China Statistics • China’s Modern Agriculture and Trade Statistics • China Economic Yearbook Volume I, 1948 • Republic of China Statistical Yearbook. • Ministry of Agriculture, available from http://www.agri.cn/, specifically http://ncpscxx.moa.gov.cn/product-web/%23/queryDataMain/agriculturalStatistics?item=3&id=4
Australia	1860-2011	1	<ul style="list-style-type: none"> • Australian Bureau of Statistics (ABS), https://www.abs.gov.au/, Historical Selected Agricultural Commodities, by state (1861 to 2011)
France	1900-2017	1	<ul style="list-style-type: none"> • Schauberger, et al. (2018)
The Netherlands	1901-2017	0	<ul style="list-style-type: none"> • Centraal Bureau voor de Statistiek (CBS) https://opendata.cbs.nl/
Italy	1866-2017	2	<ul style="list-style-type: none"> • Annuario Agricoltura Italiana, published by the National Statistical Institute (Istat) https://www.istat.it/ and https://www4.istat.it/it/prodotti/banche-dati/serie-storiche
South Africa	1917-2017	0	<ul style="list-style-type: none"> • The South African Grain Information Service https://www.sagis.org.za/historic%20whole%20grain%20info.html
Indonesia (Java and Madura)	1922-2017	1	<ul style="list-style-type: none"> • Van der Eng (1996)

Methods

All units are converted to hectares (ha) for units of harvested areas, tonnes for units of production, and tonnes/ha for units of yield. A ratio of 1/36.744 is used to convert wheat bushels to tonnes, and a value of 1/39.368 is used to convert maize bushels to tonnes. In all cases, the “Harvest_year” reported in the data set is the harvest year for the crop.

III. Data Set Description(s)

Data set description:

The Twentieth Century Crop Statistics, 1900-2017 consists of national or subnational maize and wheat production, yield, and harvested area statistics for all available years from 1900-2017. The data set combines a new digitization of crop statistics from Italy, Spain, Indonesia, China, Mexico, Uruguay, Chile, Sweden, and Morocco with existing, publicly available, digitized data sets from India, Australia, the United States, Canada, Southern Brazil, Argentina, England, Austria, Belgium, Croatia, Czech Republic, Finland, Germany, Spain, Portugal, France, the Netherlands, and South Africa. The data provides a unique crop yield data set that spans the twentieth century for many of the world's major bread baskets.

Data set web page:

SEDAC URL: <https://sedac.ciesin.columbia.edu/data/set/food-twentieth-century-crop-statistics-1900-2017>

Permanent URL: <https://doi.org/10.7927/tmsp-sg82>

Data set format:

The data are available in Excel (XLSX) format listing the country, administrative level 1 unit (where applicable), harvest year, yield, production, and harvested area. Empty cells indicate missing data.

Data set downloads:

- food-twentieth-century-crop-statistics-1900-2017-xlsx.zip

IV. How to Use the Data

The data can be read into Microsoft Excel or any appropriate program. For the convenience of data users, in addition to the original data in long format in the "CropStats" tab, SEDAC has converted the data by crop into wide format tables with countries / sub-national units listed in the first column and statistics by year in subsequent columns, from the earliest to the last year of data availability for the set of countries with statistics for that crop. For each crop there are tables by country and year for harvested area hectares (ha), production (tonnes), and yield (tonnes/ha).

V. Potential Use Cases

The Twentieth Century Crop Statistics were compiled to provide long-term estimates of crop yield variability and change across regions with available data. This data was compiled to better understand how modes of climate variability, such as the El Niño-Southern Oscillation, has affected crop yields globally in the pre-1960 time period, before FAO statistics were available. The data may be applied to any number of analyses, but

caution should be taken to understand the degree to which statistics from each country may or may not be reliable.

VI. Limitations

In all cases, the source data should be consulted to better understand limitations of the available data. In some cases, conflict, political pressure, or reporting mistakes may make the data unreliable. Difficulties collecting and reporting data may introduce random errors into the data, but there may also be systematic errors. In China, for example, there are known issues of systematic over-reporting of achievements in crop yield statistics (Xiao et al., 2014), while in Indonesia, data quality has declined since the mid-1990s (Pierre van der Eng, personal communication).

VII. Acknowledgments

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VIII. Disclaimer

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X. Recommended Citation(s)

Data set(s):

Anderson, W., W. Baethgen, F. Capitanio, P. Ciais, G. Rocca da Cunha, L. Goddard, B. Schauburger, K. Sonder, G. Podesta, M. van der Velde, L. You, and Y. Ru. 2022. Twentieth Century Crop Statistics, 1900–2017. Palisades, NY: NASA Socioeconomic Data and Applications Center (SEDAC). <https://doi.org/10.7927/tmsp-sg82>. Accessed DAY MONTH YEAR.

XI. Source Code

No source code is provided for this data set.

XII. References

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Appendix 1. Data Revision History

No revisions have been made to this data set

Appendix 2. Contributing Authors & Documentation Revision History

Revision Date	ORCID	Contributors	Revisions
August 23, 2022	0000-0003-3755-9943 0000-0002-2980-4307	W. Anderson, Tricia Chai-Onn	This document is the 1 st instance of documentation.