Web Appendix for

The Potato's Contribution to Population and Urbanization: Evidence from an Historical Experiment

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(Not for Publication)

August 2010

I. Overview of the Additional Tables and Figures

This appendix provides additional tables and figures for "The Potato's Contribution to Population and Urbanization: Evidence from an Historical Experiment" by Nathan Nunn and Nancy Qian. Table X provides a summary of the existing historical evidence of the dates of first introduction and adoption of the potato in the Old World. Full references to sources cited are provided below.

Table XI reports summary statistics for the variables used in the country-level analysis of the paper.

Table XII reports estimates of a check of the sensitivity of the results to directly controlling for measures of the geographic constraints used by the FAO as inputs for their GAEZ crop suitability variables. The three underlying geographic constraints are: climate constraints, soil constraints and terrain slope constraints. Climate constraints are determined by a host of geographic factors including daily precipitation, evapotranspiration, average daily temperatures, accumulated daily temperatures, number of frost-free days, etc. Soil constraints are a function of depth, fertility, drainage, texture and chemical constraints. Terrain slope constraints are a function of the slope of

the land.

The GAEZ classifies land into seven categories that measure soil constraint severity: no constraints, very few constraints, few constraints, partly with constraints, frequent severe constraints, very severe constraints, and unsuitable for agriculture. With this information we calculate the natural log of the total amount of land in each country that is classified as having either "no constraints", "very few constraints" or "few constraints". This is the soil constraints variable.

Climate is grouped into the following categories: no constraints, wetness constraints, moisture constraints, severe moisture constraints, temperature constraints, and severe temperature constraints. The climate constraints measure is the natural log of the amount of a country's land that has a climate defined as having "no constraints".

The severity of terrain slope constraints is measured using the following categories: no constraints, very few constraints, partly with constraints, some severe constraints, very frequent severe constraints, and unsuitable for agriculture. The slope constraints variable is the natural log of land with slope constraints falling into the following categories: "no constraints" or "very few constraints".

The GAEZ also constructs a combined constraints classification, which is based on climate, soil and terrain constraints. The measure has the following categories: no constraints, very few constraints, few constraints, partly with constraints, frequent severe constraints, very frequent severe constraints, unsuitable for agriculture, and severe climate constraints. The combined constraints variable is the natural log of country's land area that is classified as having either "no constraints", "very few constraints" or "few constraints".

We first control for the natural logarithm of land that is classified as facing few or no combined constraints, from either climate, soil, or terrain constraints. This is constructed from the GAEZ combined constraints measure. The estimates are reported in columns (1) and (5). Next, we control for each constraint measure separately. Columns (2)–(4) and (7)–(9) report estimates controlling separately for each of the three constraint variables, measuring the natural log of land area that features no or few climate, soil, or terrain constraints, respectively. In columns (5) and (10), we simultaneously control for the three constraint measures. The estimated impact of potatoes remains robust to controlling for the underlying geographic constraint measures that go into the FAO's crop suitability variables. The point estimates remain positive, highly significant and are almost exactly the same magnitudes as the baseline estimates.

Estimates including observations from the 20th century are reported in Figure V. We extend our panel by including data on population and urbanization for 1960 and 2000 from the World Bank's World Development Indicators. The figure reports the flexible estimates (i.e., equation (4)) controlling for the baseline set of covariates. As shown, the impact of the potato diminishes after 1960.

Figures VI–VII show the locations of the cities in our city-level regressions reported in Table VIII. Figure VI maps all cities within the Old World that had a population of 40,000 or more in 1900 or prior. This is the sample of cities in columns (1)–(5) of the table. Figure VII shows all European cities with a population of 1,000 or more by 1900. This is the sample from columns (7)–(8.) Figure VIII maps the town of birth of the sample of French soldiers used in Table IX.

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Table X: First introduction, initial adoption, and full diffusion of the potato in the Eastern Hemisphere.

Year	Location	Event	Source
1567	Canary Islands	Record of potatoes being shipped from Gran Canaria to Antwerp. This is the first evidence of potato cultivation outside of South America.	Hawkes and Francisco-Ortega (1993)
1573	Spain	Hospital expenditure records show purchase of potatoes in 1573 and 1576 Seville.	Hawkes and Francisco-Ortega (1992)
1601	Italy and Germany	Clusius, in his *Rariorum Plantarum Historia* , reports that the potato is grown in gardens in Italy and Germany.	Stuart (1923, p. 375-378)
1660-1724	France	Vandenbrouke dates first cultivation in Alsace to 1623 and its adoption as a field crop to 1660. Laufer dates the onset of adoption as between 1714 and 1724 in Alsace, and the late 17th century in Franche-Comte, Lorraine, Burgundy and Lyonnais.	Laufer (1938, pp. 60-61); Vandenbroeke (1971, pp. 21-22)
1670, 1680-1698	Belgium	The potato was being harvested as a field crop in West Flanders. Cultivation increased significantly between 1680 and 1698.	Vandenbroeke (1971, p. 17)
1672-1681	India	John Fryer, in his account of his travels in India between 1672 and 1681, provides the first written accounts of potato cultivation and consumption in India.	Laufer (1938, p. 91)
1680-1683	Japan	During the Tenwa era, the potato is cultivated for cattle feed.	Laufer (1938, p. 82)
1698	Belgium	Potatoes were being planted in fields in East Flanders 1708.	Vandenbroeke (1971, p. 17)
1699	England	Reports of the potato being very common in Lancashire, having been introduced from Ireland.	Laufer (1938, pp. 58)
1725	Sweden	Potato first introduced to Sweden by Jonas Alstromer.	Laufer (1938, p. 68)
1743	Scotland	By this time, South Uist and Benbecula parishes in Inverness county had adopted the potato.	*Statistical Account of Scotland, 1795*
1744	Prussia	Frederick the Great distributes seed potatoes and sets royal decrees that order subjects to grow potatoes to insure against crop failure.	Laufer (1938, p. 67)
1758	Norway	Potato is first cultivated in Norway. It spread quickly over the next 50 years.	Laufer (1938, p. 67)
1756-1763, 1770	Prussia	During the Seven Years War and the famine of 1770 the benefits of potatoes become more apparent. Adoption becomes more widespread, and within decades the potato become an indispensible staple.	Laufer (1938, pp. 67-68)
1764	Sweden	Royal edict issued to further encourage potato cultivation. Was successful at promoting the general adoption of potato cultivation.	Stuart (1923, p. 380)
1771	France	Parmentier wins prize from the Academy of Besancon for discovering a new food that could replace cereals in case of a famine. He is given over 100 acres of land to plant potatoes.	Stuart (1923, p. 380)
1772-1773	New Zealand	Potatoes introduced by James Cook and Marion du Fresne. No evidence of widespread adoption immediately following these introductions.	Harris and Niha (1999)
1772	India	Reports of potato cultivation in Bengal during the period when Warren Hastings was Governor General (1772-1785).	Stuart (1923, p. 381)
1775	Scotland	Potato cultivation has spread throughout Highland Scotland prior to this date.	*Statistical Account of Scotland, 1795*
1793	New Zealand	Lt. King, Governor of Norfolk Island, provides Maoris with seeds, tools, and other implements. The Maoris quickly and extensively adopted the plant in the decades that followed.	Harris and Niha (1999)
1780	Indonesia	Report that the potato "had gained local prominence" in Indonesia.	Boomgaard (2003, p. 585)
1781	France	Parmentier extolls the virtues of the potato in his publication "Research on Nourishing Vegetables to Substitute for the Usual Foods During Famines".	Parmentier (1781)
1789-1800	Japan, Russia	Russians introduce the potato to Japan's northern island Hokkaido. From here it migrated to the main island of Japan. By the early 19th century the potato was widely known throughout Japan.	Laufer (1938, pp. 82-83)
1793	Nepal	Explorer Kirkpatrick describes the cultivation of potatoes. Popularity continues to increase over the following decades.	Rhoades (1985)
1800	China	Record that the populations of Southwest China had replaced barley and oats with potatoes and other New World crops.	Lee (1982, p.738)
1800	Persia	Sir John Malcolm claims to have introduced the potato to Persia while on diplomatic missions, the first of which was in 1800.	Malcolm (1829, p. 369)
1818	Geogia, Armenia, Azerbaijan	Potatoes introduced to the Caucasus in 1818 by migrants from Wittenburg who settled in the region.	Laufer (1938, pp. 88)

Table XI: Summary Statistics.

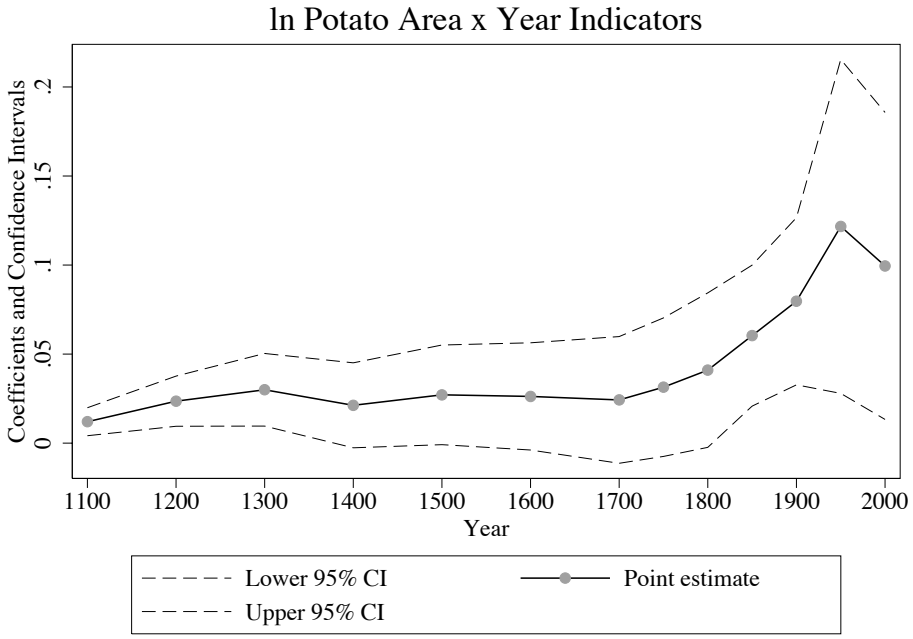
				Natural Logarithm of Variable		
Variable	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
A. Dependent Variables						
Population (Individuals)	1552	4726039	(23900000)	1552	13.32	(2.31)
City Population Share (City population/Total Population)	1552	0.019	(0.049)			
B. Agricultural Suitability Variables (1000s of hectares)						
Potato Area	1552	2811	(13430)	1552	3.76	(3.61)
All Crops Area	1552	13642	(28257)	1552	7.64	(2.80)
Old World Crops Area	1552	7934	(17888)	1552	7.08	(2.83)
New World Crops Area	1552	8187	(19141)	1552	6.78	(2.96)
Silage Maize Area	1552	2539	(10281)	1552	3.31	(3.63)
Grain Maize Area	1552	4936	(13125)	1552	5.28	(3.55)
Sweet Potato Area	1552	3706	(9133)	1552	3.38	(4.03)
Cassava Area	1552	3076	(8070)	1552	2.94	(3.99)
Land without Climate Constraints	1552	45615	(159704)	1552	6.10	(4.72)
Land without Soil Constraints	1552	13788	(28832)	1552	8.08	(2.05)
Land without Terrain Constraints	1552	22617	(66579)	1552	7.67	(2.94)
Land without Clim., Soil or Terr. Constr.	1552	5423	(13183)	1552	6.55	(2.87)
C. Geography and Climate Variables						
Tropical Area (1000s of hectares)	1552	13366	(32276)	1552	3.87	(4.76)
Average Ruggedness (slope)	1552	1.33	(1.29)	1552	-0.19	(1.04)
Average Elevation (meters)	1552	608.9	(565.2)	1552	6.00	(1.01)
Distance to Equator (degrees)	1552	28.3	(17.5)	1552	3.02	(0.99)
Malaria Index	1552	4.35	(7.15)			
D. Determinants of Growth and Development Variables						
Legal Origin: British Common Law Indicator	1552	0.28	(0.45)			
Legal Origin: French Civil Code Indicator	1552	0.40	(0.49)			
Legal Origin: Socialist Law Indicator	1552	0.25	(0.43)			
Legal Origin: German Law Indicator	1552	0.04	(0.19)			
Legal Origin: Scandinavian Law Indicator	1552	0.04	(0.19)			
Colonizer: Spanish Indicator	1552	0.02	(0.12)			
Colonizer: British Indicator	1552	0.29	(0.45)			
Colonizer: French Indicator	1552	0.19	(0.39)			
Colonizer: Portugese Indicator	1552	0.02	(0.15)			
Colonizer: German Indicator	1552	0.05	(0.21)			
Atlantic Trader Indicator	1552	0.03	(0.17)			
Roman Heritage Indicator	1552	0.06	(0.24)			
Protestant Heritage Indicator	1552	0.07	(0.26)			
Slave Exports (Persons)	1552	10102	(82789)	1552	1.28	(3.29)
Distance to an Ice-Free Coast (kms)	1552	381	(434)	1552	5.31	(1.23)

Notes: The unit of observation is a country and year. The sample excludes countries in the Americas. All variables are described in the body of the paper.

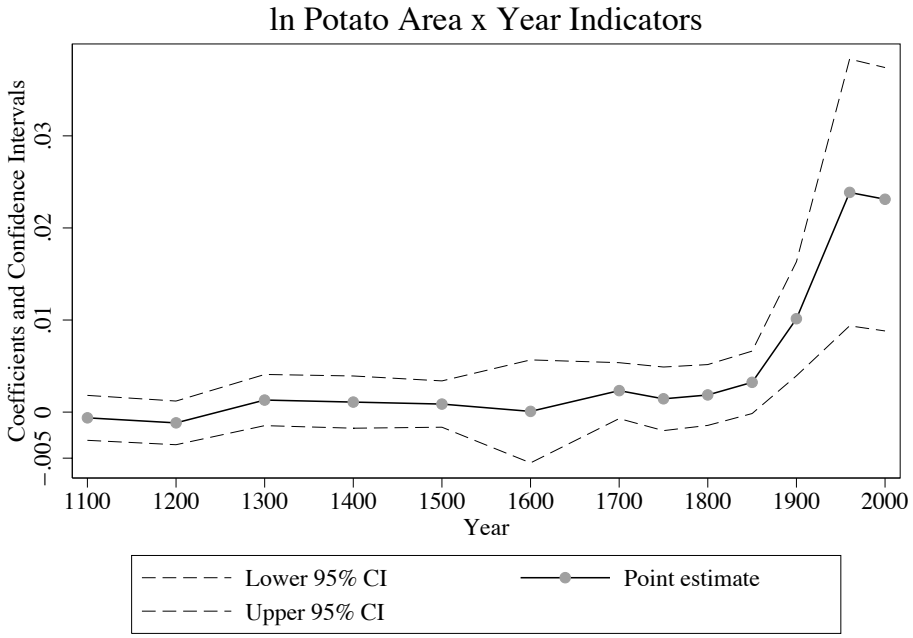
Table XII: Robustness to controlling for GAEZ component measures.

	Dependent Variable									
	ln Total Population					City Population Share				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ln Potato Area x Post	0.036	0.034	0.034	0.030	0.032	0.0037	0.0036	0.0036	0.0036	0.0034
	(0.013)	(0.012)	(0.012)	(0.011)	(0.013)	(0.0012)	(0.0011)	(0.0012)	(0.0012)	(0.0011)
Controls (x Year FEs):										
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ln Land Area Without:										
Climate, Soil or Terrain Constraints	Y	N	N	N	N	Y	N	N	N	N
Climate Constraints	N	Y	N	N	Y	N	Y	N	N	Y
Soil Constraints	N	N	Y	N	Y	N	N	Y	N	Y
Terrain Constraints	N	N	N	Y	Y	N	N	N	Y	Y
Observations	1552	1552	1552	1552	1552	1552	1552	1552	1552	1552
R-squared	0.99	0.99	0.99	0.99	0.99	0.45	0.45	0.45	0.45	0.46

Notes: Observations are at the country-year level. All regressions use a sample of Old World countries that does not include countries in North and South America. The periods are 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1750, 1800, 1850, 1900. The dependent variable is either the natural log of the total population of the country measured in persons (ln Total Population), or the share of the population living in cities with 40,000 or more inhabitants (City Population Share). "ln Potato Area" is the natural log of land that is defined as suitable for the cultivation of potatoes. The "Post" indicator variable equals zero for the periods 1000-1700 and one for the periods 1750-1900. All regressions include year fixed effects, country fixed effects, and the following "baseline controls", each interacted with the full set of time period fixed effects: ln Old World Crop Suitable Area, ln Elevation, ln Ruggedness, ln Tropical Area. Full details of the natural log of the amount of land without climate, soil and/or terrain constraints are provided in the text and data appendix. The inclusion of a control variable interacted with the full set of time period fixed effects is indicated by a "Y"; "N" indicates that the control is not included in the specification. Coefficients are reported with standard errors, clustered at the country level, in parenthesis.



(a) Total Population



(b) Urbanization

Figure V: Flexible estimates including the 20th century.

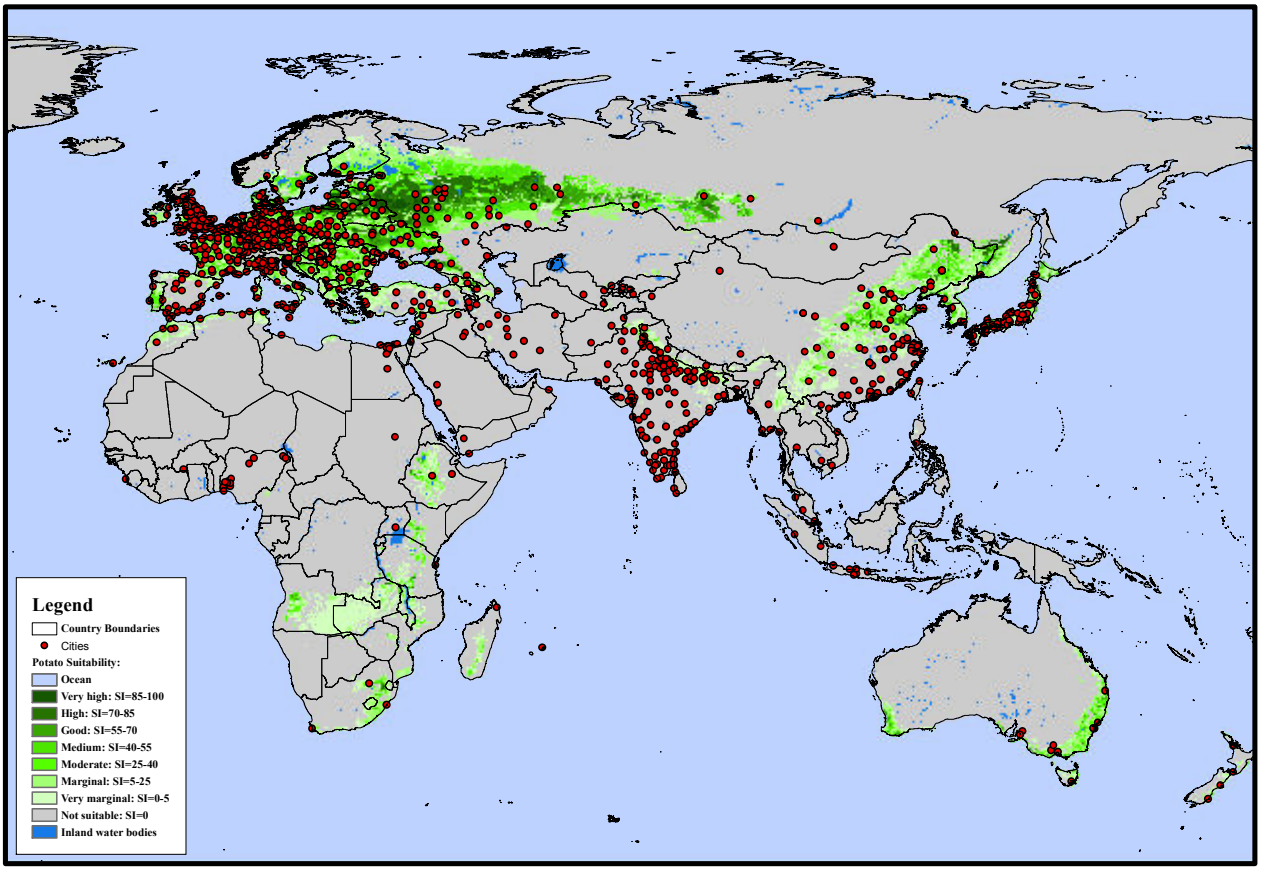


Figure VI: Locations of Old World cities with more than 40,000 people (in 1900 or prior).

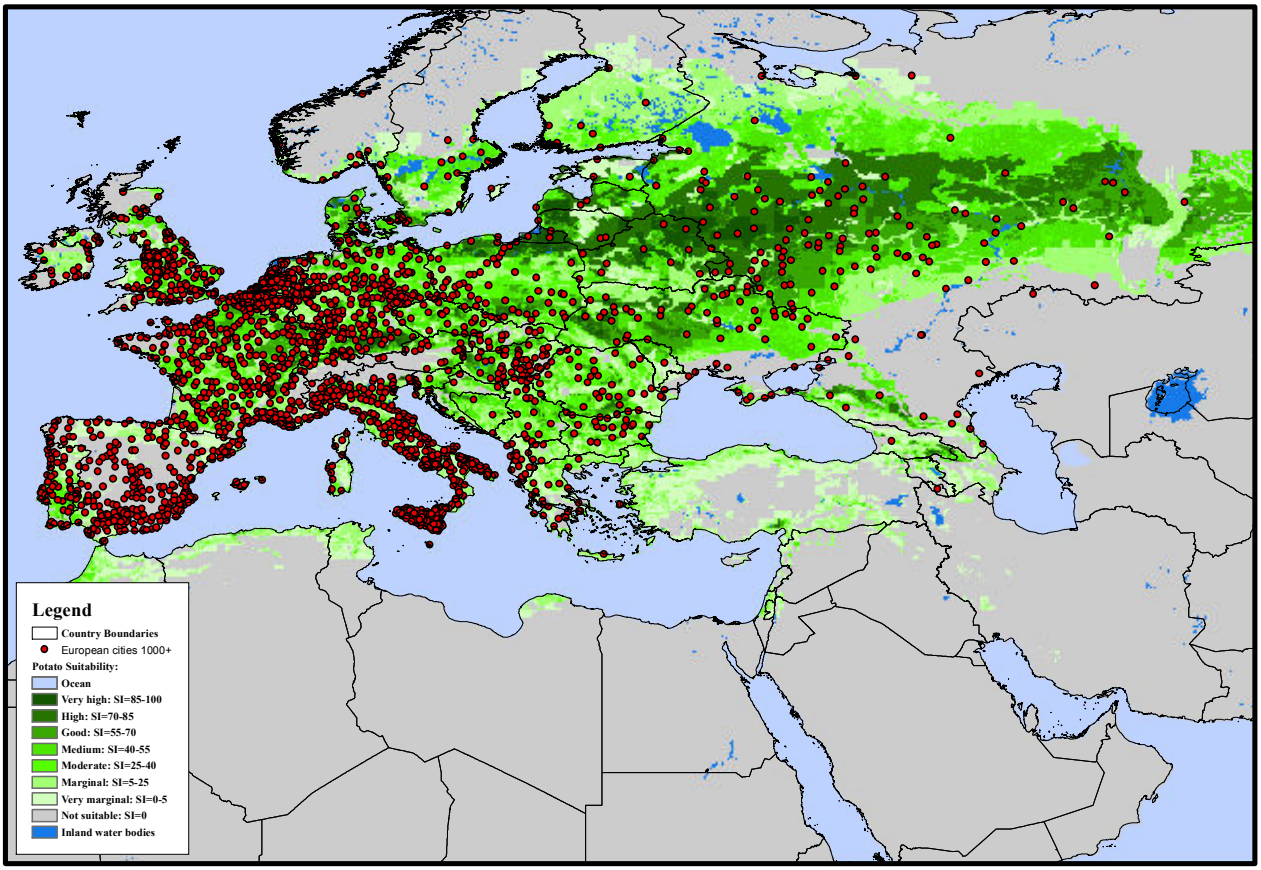


Figure VII: Locations of European cities with more than 1,000 people (in 1900 or prior).

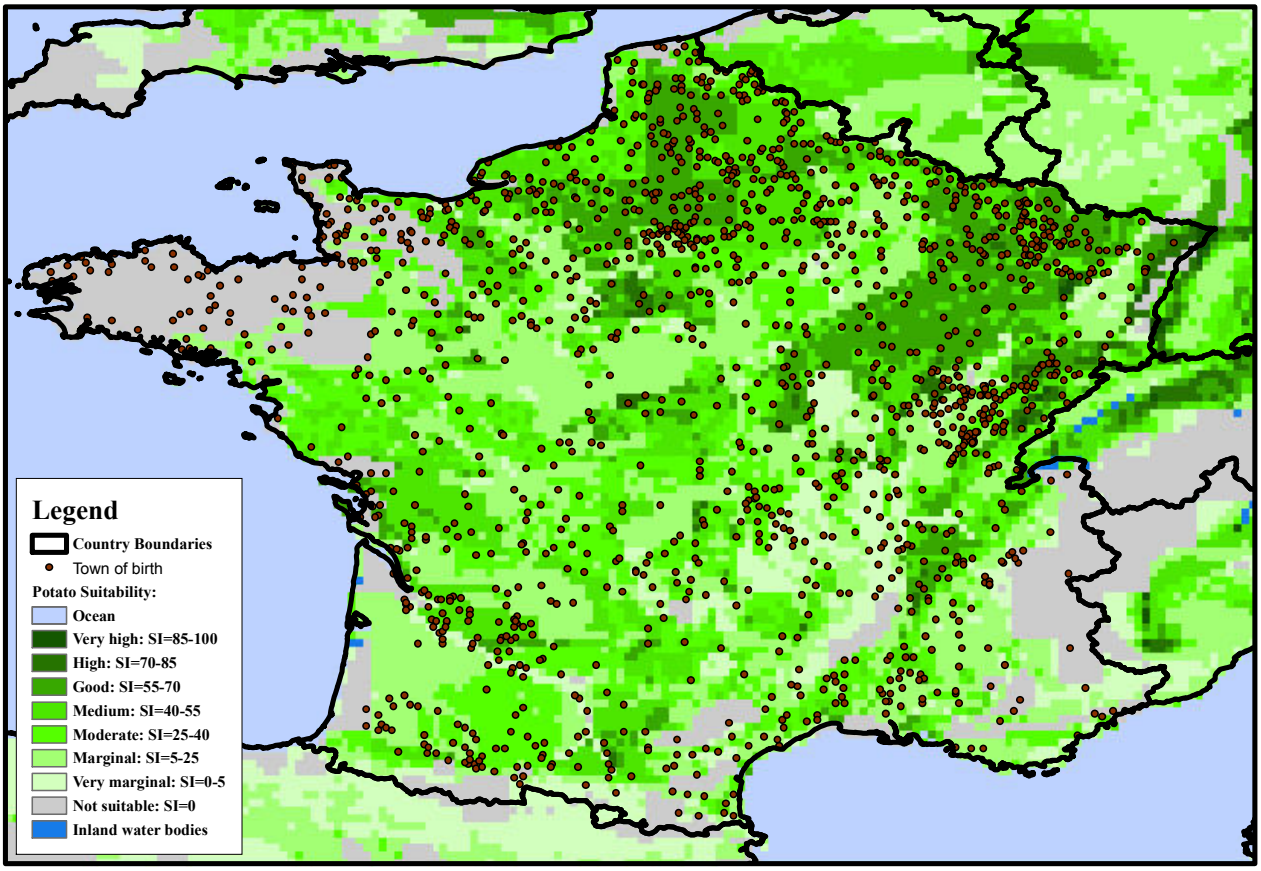


Figure VIII: Locations of the birth towns of French soldiers.