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THE BOUTELOU BROTHERS: FROM GARDENING TO AGRONOMIC PRACTICES, EDUCATION, AND TRAVELS IN SPAIN AT THE TURN OF THE NINETEENTH CENTURY

by

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At the turn of the nineteenth century, agriculture in Spain was seen as an empirical know-how that was transmitted from generation to generation through practice. However, at the royal gardens the idea that agriculture was a scientific branch of knowledge was already germinating. Focusing on the two brothers—Claudio (1774–1842) and Esteban (1776–1812) Boutelou—this paper argues that these gardeners, profiting from their positions at the Spanish royal gardens, promoted agronomic development and education. In spite of the importance of the Boutelou family, a five-generation dynasty of gardeners, historiography has paid scant attention to them, as well as to the importance of agronomic travels and their reports. This paper aims at interweaving the boundaries between the history of science, history of agriculture, and gardens and landscape studies. Through the lenses of history of science and the application of Long's conceptual framework of 'trading zones' and Baldassarri and Matei's 'gardens as laboratories', we focus on the position of the Boutelou brothers in the gardens of the royal estates and the new Sanlúcar acclimatization garden. We then demonstrate how they were influenced by travels abroad and how Arthur Young, a Briton, became their role model. Moreover, we establish a relation between the Boutelou's network of experts and the rise of translations of English and French books and the appearance of the first agricultural teaching manuals in Castilian, often published in the context of agricultural societies. Finally, we show how this was fundamental to the renewal of agronomic practices and education in Spain.

Keywords: botanical gardens; agronomic education; agronomic manuals and translations; agronomic travels; new agriculture; Spanish agriculture

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Introduction

Focusing on the role of the two Boutelou brothers in botanical experiments and education, this paper argues that these gardeners, profiting from their positions at the Spanish royal gardens, promoted agronomic development at the turn of the nineteenth century to such an extent that they became key-actors in the development of agronomic education, and that they did so through travels to England and translations of English and French books and articles into Castilian.

The first Spanish agronomy education projects started out with courses taught at botanical gardens, such as Sanlúcar in 1807, and Madrid in 1808, and later at institutions deemed equivalent in status to universities, such as the Agronomic School of Aranjuez, launched in 1856 under the Liberal regime.[1] However, even prior to these initiatives, we argue that there were already serious endeavours ongoing at the Court of King Carlos IV (1748–1819) that sought to bring about significant changes to Spanish agronomic education, including the planting of experimental gardens, the launching of magazines and the funding of travels for study abroad. Spanish historians have already stressed how aristocratic culture represented a key input into the process of Spanish agrarian modernization and the emergence of experts, whereas historians of science have so far hardly acknowledged the ways in which the Court contributed to the recognition of a new science,[2] agronomy. In particular, historiography has broadly ignored the importance of agronomic travels, their reports and the corresponding impacts on the modernization of Spanish agriculture. Therefore, we argue that the Boutelou brothers, owing to their positions at the Spanish Court and the inspiration they received from contacts with foreign experts, literature, and travels to Great Britain, contributed to the emergence of an agronomic culture in Spain broadly in keeping with the 'new agriculture' that emerged during the British agricultural revolution.[3]

This paper therefore interweaves the boundaries between the history of science, the history of agriculture, and garden and landscape studies by tracing the trajectory of two gardeners—the Boutelou brothers—as key-actors in promoting agronomic education at royal gardens that are usually more associated with pleasure and leisure. In spite of the importance of the Boutelou family, a five-generation dynasty of gardeners, historiography has paid scant attention to them.[4] Gardens and landscape studies have spawned a vast literature on the

1 Lourenzo Fernández Prieto, 'La política agraria del Estado Español contemporáneo hasta 1936. Del propietario innovador al fomento de la innovación en la pequeña explotación', *Hist. Contemp.* **17**, 237–286 (1998); Jara Muñoz Hernández, 'El origen de la Escuela de Agrónomos en La Flamenca', *An. Inst. Estud. Madr.* **57**, 81–103 (2017); Juan Pan-Montojo, 'La revolución liberal y las transformaciones de la agricultura española', *Áreas Rev. Int. Cienc. Social.* **37**, 29–46 (2018); Juan Pimentel and José Pardo-Tomás, 'And yet, we were moderns: the paradoxes of Iberian science after the Grand Narratives', *Hist. Sci.* **55**, 133–147 (2017).

2 Ursula Klein, 'Hybrid experts', in *The structures of practical knowledge* (ed. M. Valleriani), pp. 287–306 (Springer, Dordrecht, 2017). Felix Labrador and Koldo Trapaga argue that managing the royal forests became a major concern to the Spanish monarchs, thus driving the appointment of royal experts. See Félix Labrador Arroyo and Koldo Trápaga Monchet, 'Forestry, territorial organization, and military struggle in the early modern Spanish monarchy', *Environ. Hist.* **23**, 318–341 (2018). Moreover, scholars have demonstrated how engineers, such as Agustín de Betancourt (1758–1824), strove to introduce new machines and technologies, first in the royal estates, and later in the broader national geography. See Irina Gouzevitch, 'Les voyages en France et en Angleterre et la naissance d'un expert technique: le cas d'Augustin Betancourt (1758–1824)', *Doc. Hist. Tech.* **19**, 97–117 (2010).

3 On the agricultural revolution see, for instance, Peter M. Jones, *Agricultural enlightenment. knowledge, technology, and nature, 1750–1840* (Oxford University Press, 2016).

4 Most of the bibliography concerns topics such as their interventions in the gardens of the royalty and aristocracy, the role some family members played in agricultural education and agronomic culture, and the varieties of vine collected by the Madrid herbarium. On the Boutelou family, see José Luis Sancho Gaspar, 'Proyectos del siglo XVIII para los Jardines de Palacio de Madrid: Esteban Boutelou y Garnier de L'Isle', *An. Inst. Estud. Madr.* **25**, 403–433 (1988); Ignacio García-Pereda and Francisco Javier Girón, 'La enseñanza de la agricultura en la España de Fernando VII: el caso de Claudio Boutelou en el Jardín Botánico del Consulado de

botanical and royal gardens to the detriment of gardener biographies beyond the most famous propagators of the French and British art of gardens. The history of science and technology has already addressed the careers of head gardeners in provincial France, such as Antoine Banal and his son.[5] The history of agriculture has tackled the transformation of agriculture at the end of the *ancien régime* in Spain, brought about by the physiocratic spirit of a group of Enlightened men who promoted this 'new agriculture' in the context of Economic Societies, including the network established with the French agronomists, coupled with the role played by agriculture manuals in the rise of experts.[6] Deborah Fitzgerald, Lisa Onaga, Emily Pawley, Denise Phillips and Jeremy Vetter, in their 'Roundtable: agricultural history and the history of science', argued for applying the methodologies and perspectives of the history of science to agriculture and suggested some topics that this would be especially apt for, including the plurality and global nature of knowledge production, and the tensions prevailing between agriculture and capitalism, politics, and the economy.[7]

In accordance with this emerging historiography on the interplay between the history of science and agricultural history, this paper contributes in different ways to this multidisciplinary approach by dealing with recent trends in the history of science, such as Pamela Long's conceptual framework of spaces for knowledge production as 'trading zones'[8] in which, beyond the laboratories, there were different spaces for the exchange and negotiation of knowledge, such as gardens, which have been compared to laboratories by Fabrizio Baldassarri and Oana Matei.[9] These concepts are particularly useful to analyse the growing ambivalence of gardens for pleasure and for knowledge-building, and correspondingly to the changes taking place in royal and botanical gardens where botany and the applied science of horticulture and gardening practices were rehearsed within the framework of leveraging the development of agronomic knowledge.

These arguments are presented in four sections. Initially, we approach three case studies in which the Boutelou brothers have applied gardening practice as experimental practices to foster agronomic education: first Claudio Boutelou (1774–1842; figure 1) in the Royal Garden of the Buen Retiro; second, his trajectory from gardener-in-chief to professor of agronomy at the Royal Botanic Garden of Madrid; and third, Esteban Boutelou (1776–1812) and his endeavours at the Sanlúcar de Barrameda Garden, southern Spain.

Alicante (1816–1819)', *Bouteloua* **9**, 56–71 (2012); Ignacio García-Pereda and Victoria Soto Caba, 'Jardinería y cultura libresca en el Real Sitio de San Ildefonso de La Granja: la biblioteca de Etienne Marchand y Esteban Boutelou', *Cidade Évora* **1**, 470–479 (2016); María Carmen Martínez *et al.*, 'El herbario de variedades de vid de Simón de Rojas Clemente y otras aportaciones. Valor científico y utilidad sociocultural de su legado', *Arbor* **791**, 1–10 (2019).

5 James Livesey, 'Botany and provincial enlightenment in Montpellier: Antoine Banal Père and fils 1750–1800', *Hist. Sci.* **43**, 57–76 (2005). On André Thouin, see Emma Spary, *Utopia's garden. French natural history from Old Regime to Revolution* (Chicago University Press, 2000), and Yvonne Letouzey, *Le Jardin des plantes à la croisée des chemins avec André Thouin 1747–1824* (Editions du Muséum, Paris, 1989).

6 José Luis Maldonado, 'Agricultura y botánica. La herencia de la ilustración', *Hispania* **221**, 1063–1098 (2005); Pablo Cervera Ferri, 'En los orígenes del reformismo: ilustración y agronomia em Valencia (1765–1812)', *Rev. Int. Cienc. Social.* **26**, 11–29 (2007); Jesús Astigarraga, 'La Fisiocracia en España: los Principes de la législation universelle (1776) de G.L. Schmid d'Avenstein', *Hist. Agraria* **37**, 541–571 (2005); Jesús Astigarraga, 'Ramón de Salas y la difusión de la fisiocracia em España', *Hist. Agraria* **52**, 75–102 (2010).

7 Deborah Fitzgerald, Lisa Onaga, Emily Pawley, Denise Phillips and Jeremy Vetter 'Roundtable: agricultural history and the history of science', *Agric. Hist.* **92**, 569–604 (2018).

8 The notion of 'trading zone' was popularized by Pamela Long. It was adopted by Long from Peter Galison, and by Galison from anthropology. Pamela O. Long, *Artisans/practitioners and the rise of the new science* (Oregon State University Press, Corvallis, 2011). See also, Pamela O. Long, 'Trading zones in early modern Europe', *Isis* **106**, 840–848 (2015).

9 Fabrizio Baldassarri and Oana Matei (eds), 'Gardens as laboratories. The history of botany through the history of gardens', *J. Early Mod. Stud.* **6**, 9–19 (2017).

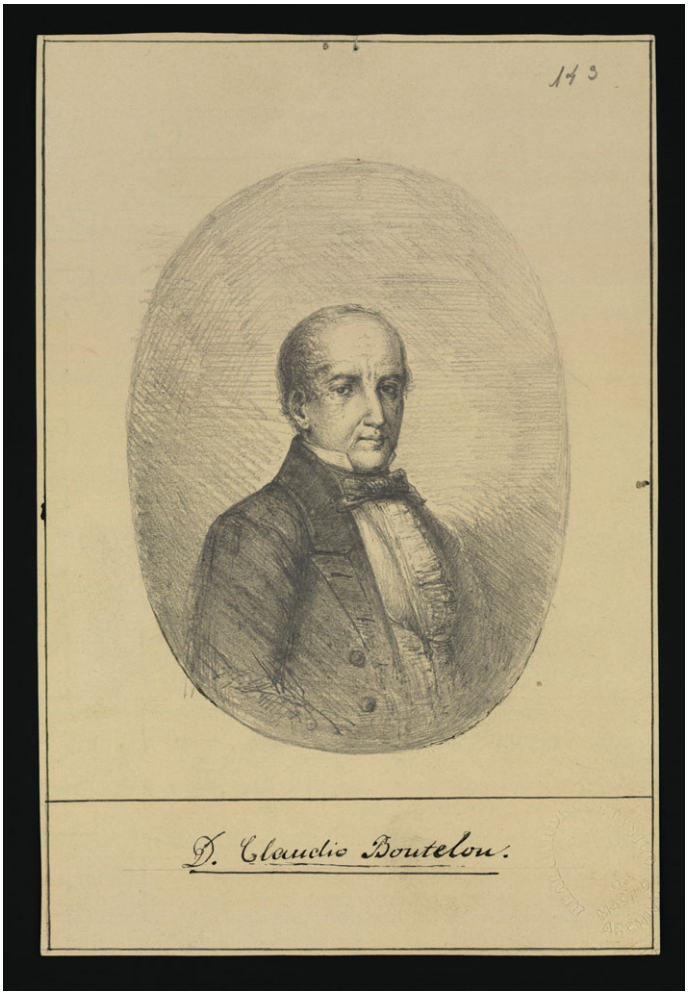


Figure 1. Claudio Boutelou, Madrid Botanical Garden Archive, *ca* 1807. (Online version in colour.)

Moreover, we then establish a relationship between their network of experts, especially the British agronomist Arthur Young (1741–1820), as a role model for the Boutelous' agronomic travels and the rise of the first agricultural teaching manuals in Castilian.

Claudio Boutelou in the gardens of King Carlos IV

The Boutelou brothers, Claudio and Esteban, may have had a French family name[10] but were themselves the fourth generation of a family of gardeners on the Spanish royal estates. Like

10 Although we do not know exactly the year of the Boutelou arrival from France, we know that at the beginning of the eighteenth century, the Spanish Court needed gardeners as the former royal gardeners had been dismissed during the War of the Spanish Succession (1701–1714). In this context, the Spanish gardener Cosme Marín was dismissed in 1707 and the French gardener

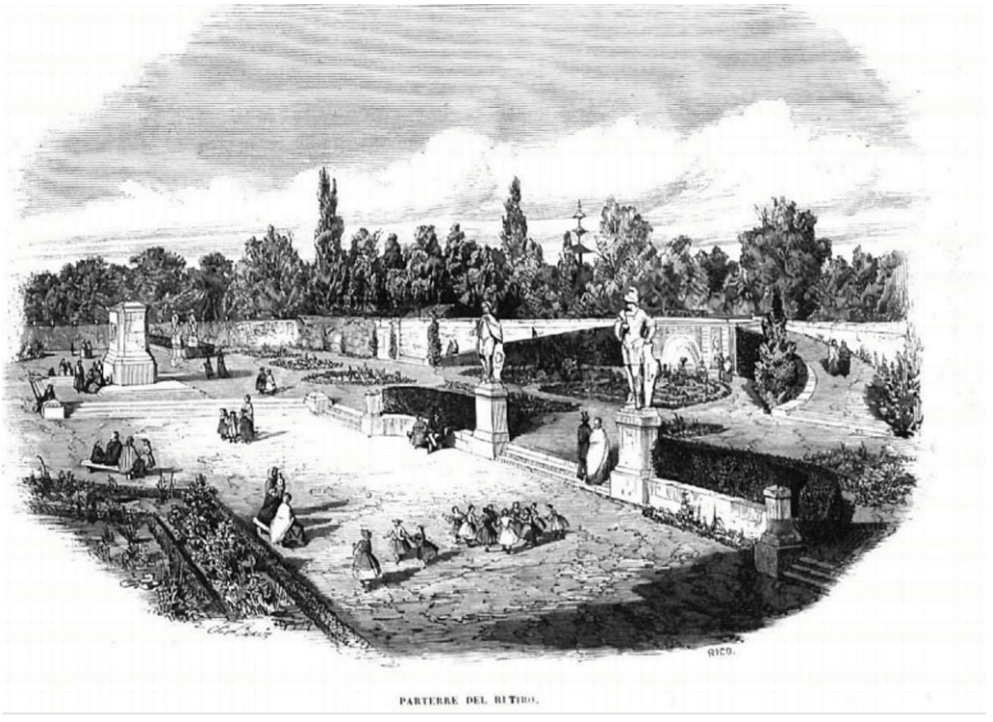


Figure 2. The Buen Retiro Gardens were an important setting for the progress of agronomic education in Spain. Buen Retiro Gardens, *Museo Universal*, 30 May 1858, Biblioteca Nacional da España, BAI-154.

their father (Pablo) and grandfather (Esteban), they were born in Aranjuez, Spain.[11] Their great-grandfather, Etienne Boutelou, had arrived in Aranjuez from France in the 1710s.[12] Pablo Boutelou travelled to Holland and England in 1766 to ensure a better education.[13] His children Claudio and Esteban followed his path and travelled in France and England between 1789 and 1797. Following their return from Great Britain to Spain, Claudio immediately found a position at the Buen Retiro Royal Estate in Madrid, and Esteban stayed at the Aranjuez Royal Estate.

The Buen Retiro in Madrid was created for King Philippe IV and his court as a pleasure garden in the seventeenth century (figure 2), but it became an important political, cultural, and

Luis Renard was employed at Buen Retiro in 1712. According to Guerra de la Vega, the first Boutelou arrived in this context from the 'Potager de la Reine' of the Palace of Versailles. Ramón Guerra de la Vega, *Juan de Villanueva, arquitecto del Príncipe de Asturias* (Graficinco, Madrid, 1986), p. 50. Even if the name Bouteloup means the one who hunts wolves (*loups* in French) or a place where wolf-hunting occurs, such as Varenne-Saint-Germain and Vouvray-sur-Loire in France, a Boutelou was already in Versailles at the beginning of the eighteenth century.

11 On the gardens developed by Pablo Boutelou in Aranjuez in the 1780s, see Juan F. Remón Fernández, 'The Alameda of the Duchess of Osuna: a garden of ideas', *J. Garden Hist.* **13**, 224–240 (1993); Gloria Martínez Leiva and Javier Jordán de Urríes y de la Colina, 'La fuente de Hércules y Anteo en Aranjuez. Juan Adán e Isidro Velázquez', *Philostrato* **3**, 5–38 (2018).

12 Yves Bottineau, *El arte cortesano en la corte de Felipe V (1700–1746)* (Fundación Universitaria Española, Madrid, 1986); José Luis Sancho, *op. cit.* (note 4); García-Pereda and Soto Caba, *op. cit.* (note 4).

13 Archivo General de Palacio (General Archive of the Palace; hereafter AGP), Aranjuez, 14244.

scientific centre in the late eighteenth century.[14] Several scientific institutions took their first steps in the vicinity of the Buen Retiro Palace, including the Natural History Office and the Astronomical Observatory, launched in 1790, and the court became a privileged spot for scientific and technological developments.

However, in this context, social climbing was practically impossible and with positions only becoming available following the death of the previous appointee. Therefore, following the death of both the senior gardeners of the Madrid Botanical Garden (1799) and of the gardens of the Buen Retiro Royal Estate (1800), Claudio got the position in April 1800.[15]

Claudio did not have to face any strong competition: the candidates were few and often restricted to the foremen who had served the now-deceased gardeners.[16] Claudio, a recent arrival from travelling undertaken to improve knowledge on agronomic practices, was considered more educated and cosmopolitan. Moreover, by 1800, several of his former associates were at Buen Retiro and an important network was built, including for example Mariano Luis de Urquijo (1769–1817), later minister under José Bonaparte (1808), a radical reformist,[17] advocate of the German naturalist Humboldt (1769–1859), and friend of the engineer Agustín de Betancourt. It was the ability of the Boutelou family to gain the confidence first of Urquijo and then of the Secretary of State Pedro Cevallos Guerra (1759–1839) that earned Claudio this favour from the King.[18]

Before the arrival of Claudio, the Buen Retiro Royal Estate had already been one of the first agriculture and gardening schools in Spain. The Buen Retiro was mostly maintained by Spanish gardeners, but in 1778, arriving in Madrid from Florence, the Italian Giuseppe Lumachi began a gardening school at Buen Retiro.[19] He took several boys into his charge, financing their food and clothing while also teaching them how to read, write and draw, having bought them compasses, paper, ink and pens, and paying the salaries of their teachers in subjects including gardening, theoretical botany and practical horticulture,

14 The Buen Retiro had become largely fuelled by the human capital under formation in Europe. Betancourt carried out the Madrid–Cadiz telegraph line project in 1800, the first in Spain and the second in Europe. Betancourt and Urquijo created the General Inspectorate of Roads and Canals and the corresponding Civil Engineer Corps headquartered at the Buen Retiro Palace. Moreover, several scientific institutions took their first steps in the vicinity of the Buen Retiro Palace, including the Natural History Office and the Astronomical Observatory, launched in 1790. Alfredo Baratas-Díaz, 'El núcleo de instituciones científicas matritenses en el Paseo del Prado desde el siglo XVIII', *Asclepio* **48**, 183–217 (1996). Antonio Lafuente, *Guia del Madrid científico. Ciencia y Corte* (DGI, Madrid, 1998); Antonio Lafuente and Juan Pimentel, 'La construcción de un espacio público para la ciencia: escrituras y escenarios en la ilustración española', in *Historia de la ciencia y la técnica en la corona de Castilla* (ed. Luis García Ballester), (Junta de Castilla y León, Valladolid, 2002), vol. 4, pp. 113–155; Antonio Lafuente and Nuria Valverde, *Los mundos de la ciencia en la ilustración Española* (Fundación Española para la Ciencia y la Tecnología, Madrid, 2003); Carlos Sambricio, *La arquitectura Española de la ilustración* (Consejo Superior de los Colegios de Arquitectos, Madrid, 1986), pp. 129–147 and 205–217; Fernando Roch and Jorge Disdier (eds), *Madrid y los Borbones en el siglo XVIII. La construcción de una ciudad y su territorio* (Comunidad de Madrid, Madrid, 1984); Concepció Lopezosa, *El Paseo del Prado de Madrid: arquitectura y desarrollo urbano en los siglos XVII y XVIII* (Fundación de Apoyo a la Historia del Arte Hispánico, Madrid, 2005), pp. 261–285.

15 AGP, Personal, 16844/251.

16 Archivo Jardín Botánico (hereafter AJB), 1.11.1.1.

17 Miguel Ángel Puig-Samper, 'Humboldt, un prusiano en la Corte del Rey Carlos IV', *Rev. Indias* **216**, 329–355 (1999).

18 Aged 27 years, Claudio Boutelou was a double entry on the payroll, receiving 12,000 reais (ancient Spanish currency) from the Botanical Garden and 12,600 reais from the Buen Retiro. His defeated rival for the latter position, Josef Fernández, had been a foreman with 46 years of experience and the approval of the Estate Administrator.

19 In 1761, Queen Isabel de Farnesio commissioned the French Jean Baptiste Loinville to design a Gardening School project but this was never put into practice. In 1778, Carlos III approved the new idea of Lumachi for a Public Garden School and named him as its director. AGP, Personal, 11561. Secondary sources include Carmen Ariza Muñoz, *Los jardines del Buen Retiro* (Lunwerg editores, Barcelona, 1990).

catechism, and musical education.[20] He was the author of one of the first instructional books, *Agriculture lessons*, of which 750 copies were printed.[21]

Claudio, as gardener-in-chief, used the garden for experimentation. He had to supervise the work of the gardeners as well as the pruning and the cuttings taken by the arborists. Moreover, he had to resolve a lot of quarrels among the gardeners.[22] However, both he and his brother Esteban, described as 'a curious traveller with a discursive and laborious genius',[23] also engaged in some experiments. The lands of Buen Retiro had the advantage of being a 'high and light' terrain, less sensitive to frosts than that of the Botanical Garden, for example. Therefore, they took advantage and, as the brothers were in contact with the Irishman Enrique Doyle,[24] who for years had been trying to encourage the cultivation of potatoes, they also tried planting them in Buen Retiro.[25]

Clearly, as in many other instances before and after this time–space case study, the Buen Retiro gardens acted as places for education, and as laboratories,[26] clearly confirming the place of gardens as 'trading zones' in accordance with Pamela Long's conceptual framework. Buen Retiro gardens stand out as an unexpected but fundamental place for building knowledge as it fostered multidisciplinary practices and know-how and promoted a kind of brainstorming among the various practitioners and learned men in continuous contact with nature within a controlled, artificial milieu.[27]

Claudio Boutelou: from gardener-in-chief to professor of agronomy at the Royal Botanical Garden of Madrid

In the second half of the eighteenth century, most European botanical gardens were dedicated to the study of botany, especially taxonomy, but also to the study of the medical virtues of plants, and their agricultural potential.[28]

The Real Jardín Botánico de Madrid (hereafter Royal Botanical Garden of Madrid) was first founded in 1755 before moving to the Prado Promenade in 1781.[29] Under the Spanish

20 AGP, Buen Retiro, 11764.

21 AGP, Personal, 11561/2.

22 For example, in 1749, the senior gardener Escolano had to defend his tasks and the privilege of not having inspections: 'The senior gardener is closely bound by his instructions to three things: to always have nurseries and tanks for fruit trees and shade trees; to do the planting every year in streets and schools; that he cannot cut any green trunk, without having previously had permission from the Estate Manager' (author's translation). AGP, Personal, 16870/43.

23 Enrique Doyle, *Tratado sobre la cría y propagación de pastos y ganados* (Imprenta Real, Madrid, 1799).

24 The Doyle book was one of hundreds dedicated to the tuber published across Europe in the late eighteenth century. Rebecca Earle, 'Promoting potatoes in eighteenth-century Europe', *Eighteenth Cent. Stud.* **51**, 147–162 (2018).

25 In 1803, the consul in London sent to the Sociedad Económica Matritense and Claudio Boutelou twelve potatoes, which Claudio planted in Aranjuez and in the Retiro. Esteban Boutelou, 'Observaciones sobre el cultivo de algunas especies de patatas', *Semanario* **372**, 97–105 (1804).

26 Baldassarri and Matei, *op. cit.* (note 9)

27 Botanic knowledge was in many countries built in scientific institutions. See Lisbet Koerner, *Linnaeus: nature and nation* (Harvard University Press, Cambridge, MA, 1999); Londa Schiebinger and Claudia Swan (eds), *Colonial botany: science, commerce, and politics in the early modern world* (University of Pennsylvania Press, Philadelphia, 2005); Yota Batsaki, Sarah Burke Cahalan, and Anatole Tchikine, *The botany of empire in the long eighteenth century* (Dumbarton Oaks Research Library and Collection, Washington, DC, 2016). On the Iberian Peninsula, Royal and aristocratic gardens played a role as important as botanic gardens for the study of botany and horticulture. See Ana Duarte Rodrigues, 'Jardins como espaços de ciência', in *História da Ciência em Portugal* (ed. Henrique Leitão, Palmira Fontes da Costa and Antonio Sánchez), vol. I (Tinta da China, Lisbon, forthcoming).

28 See for instance, Spary, *op. cit.* (note 5); Koerner, *op. cit.* (note 27); several essays in Schiebinger and Swan, *op. cit*. (note 27); Batsaki *et al.*, *op. cit*. (note 27).

29 Susana Pinar and Miguel Ángel Puig-Samper, 'La Botánica en el Jardín de Migas Calientes', *Asclepio* **48**, 71–100 (1996).

botanist and head of the botanical garden, Antonio José Cavanilles (1745–1804),[30] Claudio worked there as gardener-in-chief between 1801 and 1804, and in this position had to take care of cultivation, of the irrigation supply to ensure the watering of the garden, of the choice of soils and shelters for the sowing and breeding of the plants, and of storing them on stoves and in greenhouses and removing them at the appropriate times.

In the three years Claudio served as gardener-in-chief under Cavanilles, at least four plants—*Chrysanthemum indicum*, *Rosa diversifolia*, *Solanum pyracanthos* and *Hemerocalis cordata*—were acknowledged as having been introduced into the botanical garden by Boutelou.[31] Moreover, Claudio developed the most accurate studies of almost every plant group of the botanical garden, embodying the changes that were then percolating in botany, including the Madrid garden habitat, the relationships with the climate and soil, as well as the plants' diseases, parasites, and other related issues.[32]

Claudio was acknowledged by his peers and was appointed as assistant professor of botany at the Royal Botanical Garden of Madrid in 1804.[33] In this context, his functions totally changed as his obligations reached far beyond those of a gardener-in-chief, as he also took on an educational role in the garden. Thus, Claudio was also to assist the professor with preparing the materials needed for daily practical lessons and examination demonstrations. He supervised the collecting and packing of seeds according to their proper names, consulting with the professor whenever so required. He had to choose the workers, submitting a weekly list to the professor alongside other details to enter into the accountancy book of the establishment.[34]

Furthermore, in the final year under the direction of Cavanilles, in January 1803, a new professor was appointed to the Madrid Botanical Garden, one who had an important impact on the Boutelou brothers' trajectory: Francisco Antonio Zea (1766–1822). He was a Creole, initiated into botany under the instruction of the Spanish priest, botanist and mathematician José Celestino Mutis (1732–1808).[35] Zea argued that agricultural education represented a priority. Both Zea and the Boutelou brothers shared this enthusiasm to proceed with their work in the mode of a vanguard.

Claudio shared many of Zea's ideas, whom he mentioned both for his 'beneficial insights' and his status as a 'wise friend'[36] in his articles in the *Semanario de Agricultura y Artes Dirigido a los Párrocos* (hereafter *Semanario*).[37] *Semanario* was by then published by the

30 Cavanilles espoused the taxonomizing project launched by Linnaeus, which required increasingly copious flows of observations and specimens from regions near and far, with his travels to the Valencia region achieving fame. See Antonio González-Bueno, 'Reflexiones en torno a los viajes de A. J. Cavanilles por tierras de Valencia (1791–1793)', *Asclepio* **47**, 137–167 (1995).

31 Antonio José Cavanilles, *Descripción de las plantas que D. Antonio Josef Cavanilles demostró en las lecciones públicas del año 1801, precedida de los principios elementales de la botánica* (Imprenta Real, Madrid, 1802).

32 Claudio Boutelou, *Elementos de agricultura* (Martínez Dávila, Madrid, 1817).

33 AJB, 1.22.1.2.

34 AJB, 1.11.2.2.

35 As Zea could not return to Colombia, his place of birth, thanks to the intervention of Cavanilles he was entrusted with a scientific mission to Paris, financed by the quinine business, in 1800. He remained in Paris until 1802, learning under some of the members of Cavanilles' network, including Antoine Laurent de Jussieu (1748–1836).

36 Claudio Boutelou, 'Historia sobre los viveros de Aranjuez', *Semanario* **484**, 234–239 (1806), at p. 235.

37 At the turn of the nineteenth century, and especially in the wake of the Napoleonic invasion, a group of agronomist botanists, the professors of the Botanical Gardens of Madrid and Barcelona, produced the weekly agriculture journal, *Semanario de Agricultura y Artes*, published by the Society of Economics of Madrid, and the *Memorias de Agricultura y Artes*, published by the Joint Commerce Venture of Barcelona. *Semanario* wanted to establish and control a wide network for the circulation of information, including that from distant territories, as well as standardizing the resulting new knowledge. On *Semanario,* see Elena Serrano, 'Making oeconomic people: the magazine of agriculture and arts for parish rectors, 1797–1808'. *Hist. Tech.* **30**, 149–176 (2014).

Botanical Garden and bestowed to the garden a scientific and political interest. In 1805 and 1806, Zea's public lessons at the Madrid Botanical Garden made clear just what were the differences between these traditional and novel ways of approaching the study of botany. The first referred to descriptions of plants while the second approached the studying of their 'uses and virtues', clearly following the 'useful knowledge' movement already developing in different countries.[38] Gradually, the objectives of the Royal Botanical Garden of Madrid course on agriculture underwent definition.[39]

In September 1807, the Madrid Botanical Garden was again reorganized, to include the three courses of General Botany (Zea), Botany Applied to Agriculture (Claudio), and Botany Applied to Medicine (Mariano Lagasca).[40] Claudio was to officially inaugurate his course on 20 April 1808.[41] The *Gazeta* published on 5 April 1808, already issued under the temporary government of Fernando VII, indicates in a Royal Order that the graduates of the course of agriculture would first be sent on field trips in Spain, then abroad, and finally they would be granted land to 'put into practice the knowledge acquired on their trips'.[42] However, in that same month, King Fernando VII, accompanied by experts such as Zea, was forced to sign the Bayonne Constitution that Napoleon Bonaparte had ordered to assume power over the Spanish Court, disrupting the ongoing agronomic development.[43] Claudio Boutelou was also criticized for being a collaborator with the French attacker as between 1813 and 1814 he was the director of the society Real Sociedad Económica Matritense de Amigos del País (Madrid Royal Society of Economy of the Country's Friends).[44]

Esteban Boutelou and his endeavours at the Sanlúcar de Barrameda garden

Zea and the Boutelou brothers were at the core of those who did more for the promotion of agronomic developments. Following their conferences and courses at the Royal Botanical Garden of Madrid, the Royal Order of December 1805 decided on the foundation of 24 establishments with the main objective of illustrating and promoting agriculture under the leadership of students from the royal garden across a truly comprehensive network of model farms. Of the new establishments planned, the project was implemented with some success in the Real Jardín Experimental y de Aclimatación, also known as the Sanlúcar de

38 Regarding 'useful knowledge' see *Hist. Sci.* **45**(2) (2007), especially Maxine Berg's introductory essay; and John Gascoigne, *Joseph Banks and the English Enlightenment: useful knowledge and polite culture* (Cambridge University Press, 1994). See the historiography on the popularization of science, and especially on agriculture and Economic Societies. For instance, Jones, *op. cit.* (note 3).

39 Juan Piqueras Haba, 'De la botánica 'inútil' a la ciencia aplicada. Simón de Rojas Clemente y Rubio', *Cuad. Geogr.* **97**, 5–29 (2015), at p. 29.

40 Antonio González Bueno, 'Los estudios criptogámicos en España (1800–1820): una aproximación a la escuela Botánica de Cavanilles', *Llull* **11**, 51–74 (1988).

41 *Gazeta de Méjico*, 22 June 1808.

42 *Gazeta de Méjico*, 5 April 1808.

43 Stuart Woolf, *Napoleon's integration of Europe* (Routledge, London, 1991).

44 Since 1775, the Madrid Royal Society of Economy of the Country's Friends played an important role in promoting technical inventions and schools of mechanics and agriculture. José Ramón Bertomeu Sánchez, 'Los cultivadores de la ciencia españoles y el gobierno de José I (1808–1813). Un estudio prosopográfico', *Asclepio* **46**, 259–289 (1994); Elisa Martín-Valdepeñas Yagüe, 'Los Estatutos de la Real Sociedad Económica Matritense de Amigos del País de 1775 y sus intentos de reforma (1775–1808)', *Cuad. Estud. Siglo XVIII* **27**, 219–250 (2017).

Barrameda garden in Cádiz. The new botanic garden of Sanlúcar de Barrameda began its construction in 1806 and was inaugurated in 1807.[45]

We argue that this garden acted as a laboratory dedicated to agronomic experiments in order to generate better yields from and for agricultural production. There, Esteban had the opportunity to design a garden from its very beginning, which he would decide to divide up into eight spaces:[46] a botanical school for teaching practical agriculture, and areas for cereal trials, for artificial pastures for cattle feed, for grape varieties, for plants related to the medical arts and crafts, for fruit trees and their grafts, for trees grown for boat construction wood, and greenhouses to acclimatize exotic species.[47]

Among the toughest challenges faced by nineteenth-century Spanish rural planners was ascertaining the means to induce farmers into adopting new agricultural practices. The Sanlúcar garden thus functioned as a 'workshop of the hands and mind',[48] that is, a conjunction of technical skills and theoretical knowledge—as a 'laboratory'. As Long claims with the 'trading zones' conceptual framework, there existed a mutual and reciprocal influence between artisans (farmers) and scholars, and a welding together of both cultures.[49]

This garden would register all the trials and errors of the experimental activity. The pivotal actors in this 'laboratory' were Esteban and the librarian of the Royal Botanical Garden of Madrid, Simón de Rojas Clemente (1777–1827), as they were appointed professors of agriculture of the new Sanlúcar Botanical Garden in August 1806.[50] However, as Esteban continued to be the gardener-in-chief of the Royal Gardens of Aranjuez,[51] he could only take some stipends to teach at the Sanlúcar Botanical Garden (figure 3).[52] Until 1807, 25 000 trees had already been planted.[53] Unfortunately, the local revolts against the politician Manuel Godoy (1767–1851)[54] and later the French wars destroyed the garden and the project was never resumed.[55]

For two years, Esteban and Simón taught at the Sanlúcar garden and were enrolled in the technical preparation of the new garden, embedded within the particular regional, environmental and institutional context of the Sanlúcar wine region.[56] The biophysical conditions prevailing in the region, together with its economic characteristics, proved to be very special for vine growth, and here were to be found some of the most important wine

45 Antonio Cabral Chamorro, 'El jardín botánico Príncipe da Paz de Sanlúcar de Barrameda: una instituición ilustrada al servicio de la producción agraria y forestal', *Rev. Estud. Andal.* **21**, 165–188 (1995).

46 In 1808, there were 2173 Lombardy poplars, 3672 'cinamomos', 1670 'algarrobos de Chile', 2340 honey locust, 250 'mangles de Luisiana', 123 *Bignonias catalpa*, 823 *Platanus*. See Antonio Cabral Chamorro, *op. cit*. (note 45).

47 Francisco Márquez Hidalgo, *Jardín Botánico de la Paz de Sanlúcar de Barrameda. Sanlúcar de Barrameda* (Sevilla: Pequeñas Ideas Editoriales, 2002), p. 36.

48 Lisa Roberts, Simon Schaffer and Peter Dear (eds), *The mindful hand* (KNAW, Amsterdam, 2007). Pamela H. Smith, *The body of the artisan: art and experience in the scientific revolution* (University of Chicago Press, 2004).

49 Long, *op. cit.* (note 8), p. 842.

50 Simón de Rojas Clemente, *Ensayo sobre las variedades de la vid común que vegetan en Andalucía, con un índice etimológico y tres listas de plantas en que se caracterizan varias especies nuevas* (Imprenta de Villalpando, Madrid, 1807), p. 10. Rojas asks himself in the introduction of this book, 'Wouldn't it be more useful, he told me, to know what cultivars of grapes produce the exquisite wines of the Cape and Tokai than to know all the Epping lichens of the Epping forest?' (author's translation)

51 AGP, personal, 16680/7.

52 Márquez Hidalgo, *op. cit.* (note 43), p. 37.

53 *Semanario* **532**, 157–160 (1807), at 157.

54 On his biography of propagandistic character see Manuel Godoy, *Cuenta dada de su vida política por Don Manuel Godoy, Príncipe de la Paz* (Imprenta de I. Sancha, Madrid, 1838), p. 31.

55 Márquez Hidalgo, *op. cit.* (note 43), p. 50.

56 Guadalupe Carrasco-González, 'La presencia de comerciantes estadounidenses en España a finales del Antiguo Régimen: la actividad mercantil y los negocios de Richard Worsan Meade (1804–1818)', *Chronica Nova* **44**, 215–242 (2018).

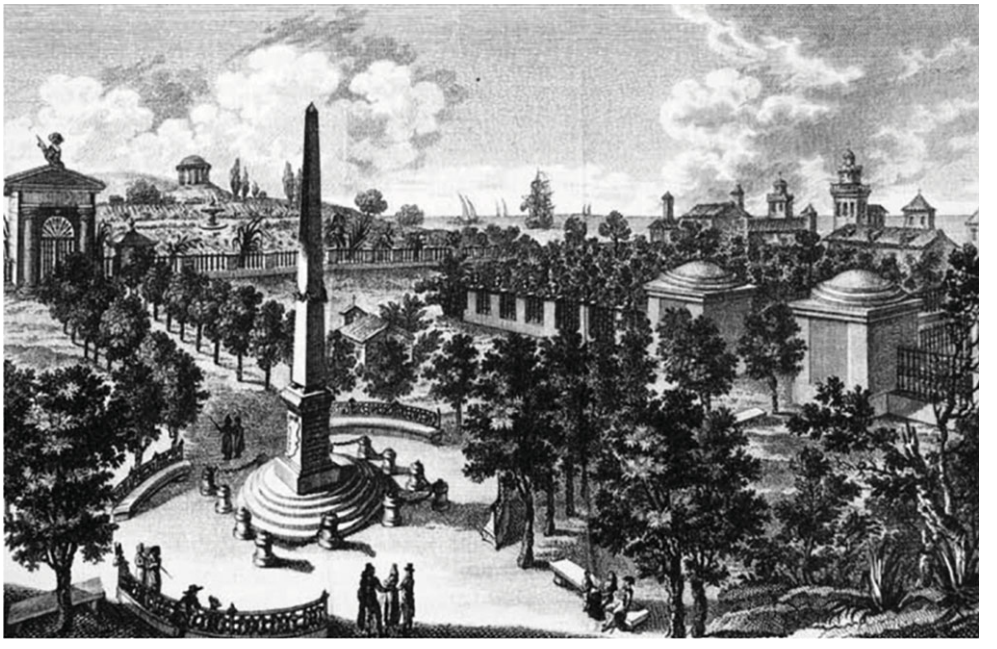


Figure 3. In the Sanlúcar garden, Esteban Boutelou and Rojas demonstrated instruments available to farmers for soil sampling and conducted fertilizing tests. Illustrations conveyed how fast the trees then grew. Francisco Márquez Hidalgo, *Jardín Botánico de la Paz de Sanlúcar de Barrameda* (Sevilla: Pequeñas Ideas Editoriales, 2002), p. 36.

exporters of Spain, including families such as Gordon and Osborne.[57] Being low in altitude and having a climate displaying seasonal extremes were just two of the environmental features of the region that made Esteban so satisfied with the Sanlúcar climate for the experimental garden.[58]

The Sanlúcar garden, as a site for both research and teaching, was to function as a deeper extension into the environment, transforming the Sanlúcar farms and vineyards into experimental fields. However, beyond natural conditions, a certain expertise on wine-making was also developed. The professors were expected to hold extensive theoretical and practical knowledge in agriculture as they were responsible for training gardeners and farmers, who were in most cases illiterate adult males. Both Simón and Esteban paid special attention to face-to-face encounters between farmers and experts. Simón spent months travelling around the vineyards of the Sanlúcar region while trying to classify the cultivars.[59] The emergence of the Sanlúcar agronomy garden forced a rapprochement between 'practical men' and 'theoretical men': between the new agriculture professors on the one hand and farmers (artisans) on the other. Moreover, throughout the writings of Simón, a narrative arises of farmers as curious learners.[60] In his reports, he expressed gratitude to some of the local farmers whom he described as 'the most intelligent wine

57 Paloma Fernández Pérez, 'Challenging the loss of an empire: the González & Byass of Jerez', *Busin. Hist.* **41**, 72–87 (1999).

58 *Semanario*, 17 December 1807, n. 572.

59 Rojas Clemente, *op. cit.* (note 46), p. 8.

60 María Carmen Martínez *et al.* 'El herbario de variedades de vid de Simón de Rojas Clemente y otras aportaciones. Valor científico y utilidad sociocultural de su legado', *Arbor* **195**, unpaginated (2019).

growers of Europe'.[61] Among these landowners and wine exporters was Jacobo Gordon,[62] who had already been importing ploughs directly from England for years,[63] and was a leading sherry exporter.[64] Following Long's conceptual framework of the 'trading zones', we argue that Gordon as an entrepreneur contributed to the development of wine production in large scale and its export to Great Britain, in which ventures between farmers and experts were undertaken with capital investment by shareholders.[65]

The *Semanario* descriptions of the Sanlúcar garden[66] contain strong similarities with the Hofwyl and Mögeli German model farms[67] with their emphasis on testing inventions, adapting new technologies, cultivating new plant species, and knowledge exchange between empirical knowledge and the 'new agriculture'. As nodes for the production of knowledge, the Sanlúcar farms were effectively adding epistemic value in the region itself, all the while maintaining close ties to the parent institutions in Madrid. One might conclude from the Madrid case and the Sanlúcar case that the first courses on agronomy and the first appointed professors appeared in the context of royal gardens and that therefore the Spanish Crown played an active role in the professionalization of agronomy.

Import of agronomic expertise: agronomic travels and translations

As we have seen in the three case studies, the Boutelou brothers promoted a change in gardening practices in Spanish royal gardens that allowed these essentially leisure gardens to play a role in education and development of agronomic expertise. For this to occur, the import of agronomic expertise from abroad through agronomic travels and translations was absolutely essential.

The first step to becoming part of an international network was the grant obtained by both brothers from the Spanish Royal House to travel to France to learn botany, horticulture and agronomy.[68] They arrived in Paris in 1789. It was not the best period to be in Paris as the French Revolution was imminent. However, they remained there for three years. During this period, they were at Versailles and they sent plants through the Spanish Embassy in France to their father and grandfather, the gardeners-in-chief of the Royal Garden of Aranjuez.[69] They must have established an important network, and became acknowledged as botanical and horticultural experts to such an extent that they were invited to become members of the Linnaean Society.

As soon as the French troops invaded Spain, diplomatic relations between France and Spain deteriorated, and the Boutelou brothers had to leave France, as the holders of royal

61 Rojas Clemente, *op. cit.* (note 46), p. 14. Rojas remembered four estate managers: 'Pablo Galán y Antonio Bernal, Capataces del Sr. Theran; Francisco Soto, Capataz de D. Jacobo Gordon; Antonio Ruiz, Capataz del pago de los PP. Gerónimos en Paxarete.'

62 On Gordon's biography, see Enrique Montañés, *La empresa exportadora del Jerez: historia económica de González Byass, 1835–1885* (Universidad de Cádiz, 2000).

63 Cabral Chamorro, *op. cit.* (note 42).

64 Guadalupe Carrasco-González, 'La presencia de comerciantes estadounidenses en España a finales del Antiguo Régimen: la actividad mercantil y los negocios de Richard Worsan Meade (1804–1818)', *Chronica Nova* **44**, 215–242 (2018).

65 Long, *op. cit.* (note 8), p. 845.

66 *Semanario* **572**, 371–376 (1807).

67 Rob J. F. Burton, 'The failure of early demonstration agriculture on nineteenth century model/pattern farms: lessons for contemporary demonstration', *J. Agric. Educ. Exten.* **26**, 223–236 (2019).

68 Ignacio García-Pereda, 'Los jardines y la agricultura de Inglaterra. Tres pensionados españoles en la década de 1790', *Bouteloua* **15**, 76–87 (2013).

69 Archivo Histórico Nacional (hereafter AHN), London Embassy papers 1791, Estado, Caja 4253.

grants depended on the Spanish Embassy. It was decided that they should continue their stay abroad, and in England they were welcomed by the Spanish Embassy, just like other Spanish students of astronomy, theatre and other subjects, supported by the Spanish Royal House.[70] Urquijo, the secretary of the ambassador, states that the Boutelou brothers were travelling throughout Great Britain, but we do not know exactly in which regions they were. In England they were certainly at Kew Gardens and they were welcomed at Joseph Banks' residence.[71] Clearly, they travelled abroad not only to burnish their professional credentials but also to attain accomplishments within the scope of becoming gentlemen of quality—a cosmopolitanism adding polish to their education. Moreover, they sent plants regularly from the Spanish Embassy in London to Bilbao harbour and from there to Aranjuez.[72] Finally, the Boutelou brothers returned to Spain in 1797 after having spent eight years in France and Great Britain.[73]

Esteban was an original and a pioneer in introducing agronomic travels into Spain in accordance with the model of the famous British agronomist Arthur Young (figure 5),[74] who was a member of several agricultural societies that played an important role in the development of agronomy.[75] Arthur Young[76] served as Secretary of the Board of Agriculture and was editor of the *Annals of agriculture*[77] and author of numerous books and brochures, becoming famous for his agronomic travels.[78] Stemming from the dynamic reforms of British agriculture in the eighteenth century—to such an extent they were deemed a revolution that pre-empted the industrial wave to come—new actors began engaging in the development of agricultural scientific practices, agronomic societies, and education coupled with their dissemination through books, journals and manuals.

Young was one of the most outstanding of these 'agricultural developers', collecting information via correspondence with the most prominent farmers of his time, both in Britain and abroad,[79] but also through agronomic travels. Collecting local agronomic practices made it imperative to operate according to uniform and standardized procedures.

70 *Ibid.*

71 AJB, 1, 54, 3, 3.

72 AHN, *op. cit.* (note 69).

73 García-Pereda, *op. cit.* (note 68).

74 As Esteban acknowledges in his first reports. See Esteban Boutelou, 'Observaciones de Agricultura hechas desde Ocaña hasta Huete en Julio, Agosto y Septiembre de 1803', *Semanario* **472**, 33–41 (1806), at p. 33.

75 'In Great Britain and Ireland at least 82 'agricultural societies' were active prior to 1810. Some 20 regional Royal Agricultural Societies (Sociétés royales d'agriculture) were established in pre-revolutionary France (mostly in the 1760s)', in Emile Justin, *Les sociétés royales d'agriculture au XVIIIe siècle (1757–1793)*, (Saint-Lô, 1935), p. 275. For further reading on British agricultural societies see Richard Johnson, ''Really useful knowledge', 1790–1850', in *Culture and processes of adult learning* (ed. Richard Edwards, Ann Hanson and Mary Thorpe), pp. 17–29 (Routledge, New York, 1993); J. Gascoigne, *Joseph Banks and the English Enlightenment: useful knowledge and polite culture* (Cambridge University Press, 2003); Koen Stapelbroek and Jani Marjanen (eds), *The rise of economic societies in the eighteenth century* (Palgrave Macmillan, New York, 2012).

76 Robert C. Allen and Cormac ó Gráda, 'On the road again with Arthur Young: English, Irish, and French agriculture during the industrial revolution', *J. Econ. Hist.* **38**, 93–116 (1998).

77 Published and edited by Arthur Young in 46 volumes between 1784 and 1808.

78 In 1768–70, early in his career, he travelled throughout Britain. His observations of agricultural practices and the rural economy materialized in nine volumes totalling some 4,500 pages.

79 Such correspondents included John Sinclair, the president of the Board of Agriculture in London, François de la Rochefoucauld in France, and George Washington in the USA. Young discussed with Washington the techniques and merits of manure, exchanged plant seeds, and compared crop test plots in the late 1780s. Thomas Jefferson was also in contact with British breeders, exchanging seeds and ideas with John Sinclair. Rodney C. Loehr, 'Arthur Young and American agriculture', *Agric. Hist.* **43**, 43–46 (1969).

Therefore, Young introduced standard field notebooks that required detailed descriptions of terrains and habitats. Young's fame and iconic status made him a useful model.[80]

In the 1790s, 'Youngmania' was taking over French agronomists as Young's work quickly benefited from sponsorship by the French republican regimes.[81] When the French gardener André Thouin moved to Holland in 1795 to confiscate naturalistic collections, his main reference was none other than Young.[82] Furthermore, Claudio explained the basic points towards making Spanish (specifically, Andalusian) agriculture profitable by referencing Young in order to contrast the British and Spanish models.[83] In *Elementos de Agricultura*, published by Claudio in 1817, Young is spoken of as the 'distinguished' and 'wise British agronomist'.[84]

The Boutelou brothers followed Young as a role model both in writings and in agronomic travels. For example, Esteban's travels through the Sanlúcar region are well known.[85] The results of these travels reflected a broadening and deepening of knowledge about the local viticulture.[86] However, Esteban's travel to the town of Jadraque remains barely known but was of equal importance as the farmers from this village sent substantial amounts of fruit to Madrid through middlemen from Alcobendas.[87] Moreover, the most important voyage for our case study here stems from his travel to Montserrat and how he toured several towns in the province of Cuenca during the first stage of the trip in 1803. He wrote travel memoirs as Young used to do. Thus, the story of this travel was published three years later, in 1806, in the pages of *Semanario*, with the title *of Observaciones de Agricultura hechas desde Ocaña hasta Huete.*[88]

These travels allowed him to reflect on two points closely related to Young's ideas: the mismanagement of the communal estates, and the improvements achievable through the implementation of fences.[89] This contrasted with a certain way of organizing the farms in open fields with uncontrolled and extensive cattle pasture, and another based on fenced lands, with alternating crops, in which foraging plants and intensive cattle ranching entered into consideration, whether maintained through crop leaves and cattle pens or only by their owners or tenants. Esteban's reports provide a clear demonstration of the close associations

80 Young believed that agricultural improvement depended on innovations such as fences and change to large-scale farms, which remained a claim long beyond the time of its original proposition. He also believed that knowledge could be formatted, packaged and delivered, in this case to landowners and farmers, in a way highly characteristic of the last generation of the Enlightenment. See Peter M. Jones, 'Arthur Young (1741–1820): for and against', *Engl. Hist. Rev.* **127**, 1100–1120 (2012).

81 Following the influential trend of British agronomy on the French practitioners. See André J. Bourde, *The influence of England on the French agronomes, 1750–1789* (Cambridge University Press, 2013).

82 Laurent Brassart, 'Les enfants d'Arthur Young. Voyageurs et voyages agronomiques dans la France impériale', *Ann. Hist. Rév. Franç.* **3**, 109–131 (2016).

83 Claudio Boutelou, 'Memoria sobre la tierra vegetal, y sus abonos', *Semanario* **538**, 249–255 (1807); Claudio Boutelou and Esteban Boutelou, 'Reflexiones sobre el uso de la sal marina ó muriate de sosa para abonar tierras', *Semanario* **548**, 3–8 (1807).

84 Claudio Boutelou, *Elementos de agricultura* (Martínez Dávila, Madrid, 1817), pp. 8–9.

85 Enrique Montañés, *op. cit.* (note 62); Juan Riera Palmero, *La ciencia extranjera en la España ilustrada: ensayo de un diccionario de traductores* (Universidad de Valladolid, 2003); Juan Riera Palmero, 'El vino y la cultura', *An. Real Acad. Med. Cir Vall* **51**, 201–240 (2014).

86 Esteban Boutelou, *Memoria sobre el cultivo de la vid en Sanlúcar de Barrameda y Xerez de la Frontera* (Imprenta de Villalpando, Madrid, 1807); Francisca Bajo Santiago, 'El nacimiento del léxico científico-técnico del vino en España: Esteban de Boutelou', in *Actas del V Congreso Internacional de Historia de la Lengua Española*, vol. II (Gredos, Madrid, 2002), pp. 1899–1914.

87 Esteban Boutelou 'Varias observaciones sobre la agricultura de Jadraque', *Semanario* **536**, 1–4 (1807).

88 Esteban Boutelou, *op. cit.* (note 74).

89 What characterized property under the *ancien régime* was precisely the diversity of property rights and land use. Sowing was an individual right; the harvesting of wild fruits and herbs and hunting were communal rights; the right to pick the fruits of trees (*vuelo*) frequently belonged to someone different from the landowner (*suelo*). Lands, even some enclosed ones, had to be open in order not to prevent the exercise of communal use.

prevailing between travels, political economy, and agriculture improvement. Esteban believed that by eliminating communal practices inherited from the past, farmers would bring about improvements in woodland and forest production. For that reason, he was in favour of controlling the entrance of cattle.[90] Esteban also considered it was necessary to secure private property through enclosures.

In Spain, prior to the arrival of Napoleonic troops in 1808, Esteban was promoting travel writing as an important means of recounting individual travel experiences as a way of working just as Young codified the methodology and procedures of agronomic travels. Both the *Semanario* papers (figure 4) and the books by the Boutelou brothers applied the agricultural descriptions set down by Young as a good justification for their discourse on ways to modernize Spanish agriculture. In 1801, *Semanario* published the *Extracto de los viajes de Arthur Young en Inglaterra*.[91] In 1802, another Young text was translated and published: *Ventajas de la agricultura sobre las fábricas*,[92] in which the *Semanario* editor notes Young as possessing 'wit, meditation and well thought out political calculations' compared with other Spanish writers who 'want to reduce us to the Pastoral life of the Patriarchs'. On the last day of 1802, another Young translation was published: *Consejos a un hidalgo sobre el modo de cuidar su Hacienda y la economía de la casa.*[93] In November 1803, Young was again translated: *Pimpinela para Prados*.[94] At the end of this article appeared some lines taken from the 1801 work by the Boutelou brothers, *Tratado de la Huerta*,[95] commenting on experiences with growing pimpernel on the Aranjuez Royal Estate.

In keeping with the international trend in the expansion of agronomic literature through the publication of books, journals, manuals, and guides for broader public audiences,[96] there was a similar increase in the importance of the literature on agriculture published in Spain between 1789 and 1808.[97] Some of the first publications on agriculture produced in Spain were translations into Castilian, one of the greatest means for the circulation of scientific and technical knowledge.[98]

90 Boutelou, *op. cit* (note 74), p. 35. 'The hill of Villarrubia is poorly maintained, low, and poorly populated with small, stunted oaks and some holm oak. It does not admit any doubt that with only the prohibition of the entrance of cattle in many mountains and coppices, many pieces of forest destroyed by the voracious tooth of the woolly and goat cattle will be quickly renewed. These stand out as the tender shoots and guides of scrubland, to gnaw and destroy the tender saplings that would have populated the hollow and void of the forest in the future. Once these young plants have been destroyed, the successive advancement of the grove is not achieved, and all the fertile feet that would have replaced the mares in the series of some years were completely disabled …. The early entry of cattle into the mountains often prevents seed-borne plants from being achieved, which always give rise to more robust and healthy plants. From this, it follows that the conservation and repopulation of the forest is based almost exclusively on the shoots of vine or lower plants, weak and of less benefit that have escaped the teeth of cattle.' (author's translation)

91 *Semanario* **219**, 153–169 (1801).

92 *Semanario* **276**, 225–236 (1802).

93 *Semanario* **313**, 417–420 (1802).

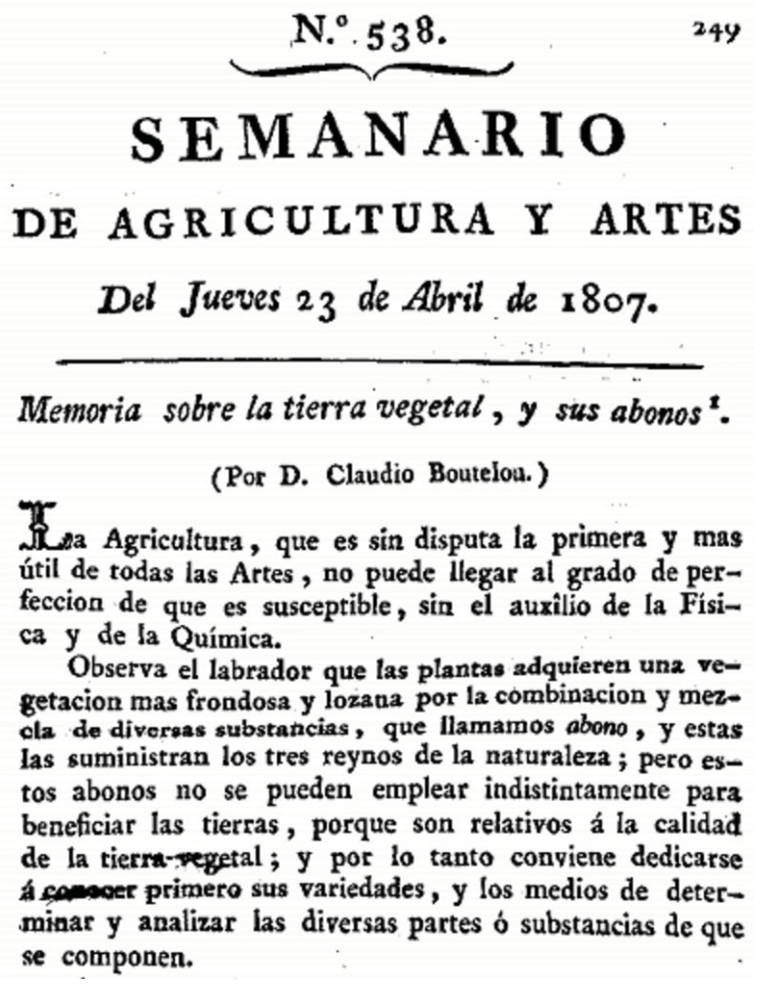
94 *Semanario* **357**, 273–278 (1803).

95 Claudio Boutelou and Esteban Boutelou, *Tratado de la Huerta* (Imprenta de Villalpando, Madrid, 1801).

96 Maria de Fátima Nunes, *A imprensa periódica científica (1772–1851): leituras de 'sciencia agrícola' em Portugal* (Estar Editora, Lisbon, 2001). Terence M. Russell and Ann-Marie Thornton, *Gardens and landscapes in the encyclopaedie of Diderot and d'Alembert* (Ashgate, Aldershot, 1999); G. Dawson, B. Lightman, S. Shuttleworth and J. R. Topham, *Science periodicals in nineteenth-century Britain: constructing scientific communities* (University of Chicago Press, 2020).

97 Luis Pablo Núñez, 'Voces técnicas del ámbito de la agricultura y jardinería según los glosarios de Claudio Boutelou', *Bol. Real Acad. Españ.* **300**, 289–330 (2009).

98 Such as Gustavo Adolfo Gyllemborg's *Natural and chemical elements of agriculture* in 1794; Joseph Maria Calderón de la Barca (1770–1830) translated Diego Carballo y Sampayo's *Elementos de Agricultura* from Portuguese in 1795; and Duhamel de Monceau's *Elements of agriculture* was translated into Castilian by Casimiro Gómez Ortega (1741–1818) in



N.° 538. 249

SEMANARIO

DE AGRICULTURA Y ARTES

Del Jueves 23 de Abril de 1807.

Memoria sobre la tierra vegetal, y sus abonos [1].

(Por D. Claudio Boutelou.)

La Agricultura, que es sin disputa la primera y mas útil de todas las Artes, no puede llegar al grado de perfeccion de que es susceptible, sin el auxîlio de la Física y de la Química.

Observa el labrador que las plantas adquieren una vegetacion mas frondosa y lozana por la combinacion y mezcla de diversas substancias, que llamamos *abono*, y estas las suministran los tres reynos de la naturaleza; pero estos abonos no se pueden emplear indistintamente para beneficiar las tierras, porque son relativos á la calidad de la tierra-vegetal; y por lo tanto conviene dedicarse á conocer primero sus variedades, y los medios de determinar y analizar las diversas partes ó substancias de que se componen.

Figure 4. Front page of *Semanario Agricultura y Artes*, 23 April 1807, with a Claudio Boutelou article about fertilizers.

Young (figure 5) was translated and quoted by the Boutelou brothers for many different reasons, whether on institutional-related aspects regarding agricultural societies, on the advantages of certain plants, on husbandry practices, on the agronomic economy, or on agronomic travels. On several occasions, they referred to translations: in 1798, Young's *Carta sobre la conducta que debe tener una sociedad de agricultura*.[99] In 1799, the brothers published some *Indagaciones sobre las mejores especies de plantas para prados artificiales*, which details experiences with growing pimpernel before defending how

1805. See José Luis Maldonado Polo, 'Agricultura y botánica. La herencia de la ilustración', *Hispania* **221**, 1063–1098 (2005).

99 *Semanario* **87**, 129–145 (1798).

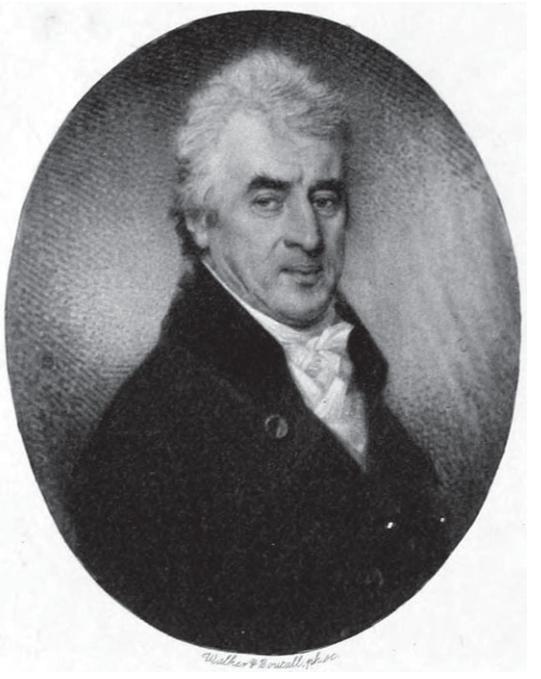


Figure 5. Engraving of Arthur Young, published in *The autobiography of Arthur Young*, 1898.

Young had 'weighed up with the most scrupulous accuracy' the reasons for and against usage of that plant.[100] The same position would be taken regarding comments about carrots.[101]

However, in parallel to these translations, the Boutelou brothers collaborated on important works, such as the French into Spanish translation by Juan Álvarez Guerra (1770–1845) of Rozier's *Cours Complet d'agriculture*, published in Spain by the Royal Press in 1798.[102]

Moreover, the brothers entered the publishing market with the *Tratado de la Huerta* (Treatise on the Vegetable Garden, 1801) and the *Tratado de las Flores* (Treatise on Flowers, 1804).[103] In Zea's opinion, the Treatise on the Vegetable Garden was more useful whereas the Treatise on Flowers was far more important not only as the first ever such work to be published in Spain and as the most complete hitherto known but also because of the neglected nature of this topic in Spain.[104]

100 *Semanario* **143**, 193–208 (1799).

101 *Semanario* **88**, 152–156 (1798).

102 *Curso Completo o Diccionario Universal de Agricultura* (Madrid, Imprenta Real, 1798).

103 Boutelou and Boutelou, *op. cit.* (note 81); Claudio Boutelou and Esteban Boutelou, *Tratado de las Flores* (Imprenta de Villalpando, Madrid, 1803).

104 'not only because it is the first published in Spain and the most complete known, but also because of the neglect that this field is among us …. Neither the magnificent circuses, nor the stadiums, nor the tournaments, the most brilliant parties or shows, the same arts, *putti* of light and fire, will not produce great effects in a country where nature is banned. Mountains populated by leafy trees, rocks glazed with flowers and vegetables: pleasant valleys and smiling meadows: immense fields covered with harvests and fruits: cities surrounded by orchards and gardens, where you can breathe pleasure and joy: what else? it is needed to elevate the imagination and magnify the soul under such a bright sky and in this classic land that off'ers at every step heroic or sublime memories.' (author's translation) *Semanario* **464**, 321–328 (1805), at p. 323.

The Boutelous encountered foreign agronomic practices more advanced than those extant in Spain in their youth and used the knowledge acquired abroad together with their family position at the Spanish court to develop agronomic practices and education at the royal gardens. Following Young as a role model, they undertook agronomic travels and writings. In the end, they were gardeners, agronomists, travellers, and authors—and definitely experts.

Concluding remarks

We have sought to demonstrate that there is a significant history of agronomic travels in Spain, and that the reports published therefore deserve attention. This history also indicates how the Boutelou brothers integrated into important Enlightenment-era networks of scientific knowledge production. Following in the footsteps of Young, Jovellanos and Zea, the Boutelou brothers advocated that this 'new agriculture' would guarantee economic development, public happiness and benevolent governance, and add to the wealth and grandeur of the nation.

We conclude that the positions held, both in the royal gardens and in the Court of King Carlos IV, in conjunction with study trips sponsored personally by the King, proved decisive to the role they played in the development of a 'new agriculture'. Travelling and establishing international networks were at the very core of the Enlightenment, but it was also the reports of these travels in Spanish newspapers, publishing articles on the travels undertaken by Young and the Boutelous, that promoted the circulation of new ideas around the progress of agriculture. The Boutelou travel reports, as the original idea for the Sanlúcar garden, reveal the varied articulations of enlightened ideas within an explicitly patriotic framework. These reports propagated descriptions of agricultural workplaces and formed one part of a larger but fragile[105] complex of enlightened improvements. The comments to the reports set out 'the proper way' to think and act.

The experimental work undertaken by the Boutelou brothers at the royal gardens, which acted as laboratories for botanical knowledge and horticulture development as an applied science, while also following the inputs and experience gained during their travels to Great Britain, augmented the scale and scope of experiments.

We have also identified how the privileged family position of the Boutelous, heirs of a family of literate gardeners, fostered the rise of these two authors. Claudio and Esteban published regularly in Spanish periodicals, disseminating the new knowledge acquired during travels alongside the results of their gardening experiments.

According to Young and Esteban, the nation needed people who held first-hand experience of the real agricultural practices of the landowners. Learning agronomy also meant learning the real practices so they might subsequently be reformed and improved. However, the delay in the implementation of agronomic innovations in southern European countries *vis-à-vis* northern Europe owes much to the political instability of the first half of the nineteenth century. Therefore, owing to a succession of crises faced for four decades that began in the wake of the Napoleonic invasions and were followed by the long process of dissolution of the Spanish absolutist monarchy, the Boutelou brothers' agronomic

105 However, the Boutelou family members were vulnerable to political changes. In 1814, Claudio was considered 'afrancesado', losing his positions at the Buen Retiro gardens and the Buen Retiro Royal Estate. He then moved to Alicante where he worked for the *Consulado Martítimo.*

innovations remained a single episode without immediate institutional impact. Spain had to await the establishment of a liberal parliamentary regime and its programme of material development in the 1850s for the rise of the first state agronomic schools. The Boutelou brothers Claudio and Esteban had been pioneers half a century earlier.

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