

Natural History for What: Seo Yu-gu's *Myeongmulhak* for Risk Mitigation in Agriculture*

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Introduction

In late Joseon period, scholars began to demonstrate a growing tendency to direct their gaze toward external objects and the natural world—including a wide variety of flora and fauna—and to take an interest in surveying their defining characteristics. From the eighteenth century onward, this scholarly orientation intensified and became increasingly specialized, broadly developing into the academic tradition known as *myeongmulhak* 名物學 (The study of names and things) or *myeongmulgojeunghak* 名物考證學 (Textual-evidential investigation of names and things).¹

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¹ This trend became particularly prominent within the writing style of *yuseo* 類書 (encyclopedia compendia or categorized reference works), which began to emerge as early as the 17th century. Yi Su-gwang 李睟光 (1563–1628)’s *Jibong yuseol* 芝峯類說 (Topical Discourses of Jibong) is recognized as a representative achievement in this genre, and Yi Ik 李穡 (1681–1763)’s *Seongho saseol* 星湖僿說 (Detailed Discourses of Seongho) is subsequently evaluated as a monumental follow-up work. In the eighteenth and 19th centuries, this trajectory was continued through the works of Seo Yu-gu 徐有榘 (1764–1845) and Yi Gyu-gyeong 李圭景 (1788–1856). Regarding this trend, see the following paper: Moon-Yong Kim, “Characteristics of Knowledge of Yuseo in the Late Joseon Dynasty 조선 후기 유서 지식의 성격,” *Korean Cultural Studies* 민족문화연구 38 (2019), 13–43; Hae-Yonn Shin, “A Study on the Erudite Learning Trend of the Intellectual Society in the 17th Century’s Joseon Dynasty: Focused on the Case of Bangye Yu Hyeongwon 17세기 조선 지식사회의 박학풍에 관한 연구: 반계 유형원의 경우,” *Journal of Humanities* 인문논총 65 (2024), 91–117.

In the development of *myeongmulhak* during the late Joseon period from the eighteenth century onward, two trajectories can be identified. First, influenced by *kaozhengxue* 考證學 (Qing Evidential Learning) that developed in China during the Qing dynasty, there was a tendency to investigate the historical origins and physical reality of the names of objects. This is considered to be related to the academic trend of the era that actively embraced Chinese material culture and scholarship, operating on the continuation of the perception that regarded China as an advanced civilization. Consequently, a key aspect of this effort was an attempt to establish the order of words and things based on classical Chinese literature. The extolment of Chinese culture and material artifacts was closely aligned with the intellectual trend known as the *bukak* 北學 (Northern Learning).² Intertwined with the Neo-Confucian concept of *gewu* 格物 (The investigation of things), this tendency further underscored the significance of self-cultivation. Second, one can note the development of *myeongmulhak*, which reflected a growing interest in the external world. Around the 19th century, writings began to emerge that investigated and compiled detailed information on physical objects such as tobacco, fish, and minerals. In these work, not only textual investigation but also empirical knowledge played a critical role.³

In the field of history of science and technology, Korean academic research regarding *myeongmulhak* during the late Joseon dynasty has primarily concentrated on the latter trend. Prior studies generally operated under the implicit assumption that this trend represented a pursuit of knowledge itself regarding external objects. Consequently, *myeongmulhak* was often understood through the lens of the characteristics and achievements of natural history based on empirical knowledge pursued by modern Western science. It is also noteworthy that ichthyological treatises—which appeared to correspond to animal taxonomy, a major subject in Western natural history—were a primary focus of study. Authored between the late eighteenth and early nineteenth centuries, works such as *Jasaneobo* 茲山魚譜 by Jeong Yak-jeon 丁若銓 (1758–1816), *Nanhoeomokji* 蘭湖漁牧志 and the *Jeoneoji* 佃漁志, a part of *Imwongyeongjeji* 林園經濟志 by Seo Yu-gu 徐有榘 (1764–1845), and *Uhaeieobo* 牛海異魚譜 by Kim Ryeo 金鑣 (1766–1821) are recognized as exemplary

² For the impact of *kaozhengxue*, refer to the following: Moon-Sik Kim, “Learning Types of Mao Qiling’s Confucian Classics Studies in the Latter Part of Chosŏn Dynasty 조선 후기 모기령(毛奇齡) 경학의 수용 양상,” *Sahakji* 사학지 38 (2006), 123–145; Hye-Ri Son, “The Recognition and Acceptance of Gu Yanwu by the Scholars of the Late Joseon: Centered on Yeongyeongjae Seong Hae-eung 조선 후기 문인들의 고염무에 대한 인식과 수용: 연경재 성해응을 중심으로,” *Daedongmunhwayeongu* 대동문화연구 73 (2010), 33–62; Kyung-Ho Sim, “The Literati in the Late Joseon Dynasty and Gu Yanwu 조선 후기 지식인과 고염무,” *Hanmunhakbo* 漢文學報 19 (2008), 509–533.

³ Dae-Hwan Noh, “A Study on the Development and Significance of Myeongmulhak in the Late eighteenth and the Early 19th Centuries 18세기 후반-19세기 전반 명물학의 전개와 성격,” *Korean Studies* 한국학연구 31 (2013), 541–572, esp. 562–567.

ichthyological encyclopedias and have consequently become subjects of intensive academic scrutiny.⁴

This existing scholarship reveals significant conceptual challenges. Because the perspectives framing eighteenth century Joseon's *myeongmulhak* have generally developed with a conscious awareness of early modern Western historical trajectories, the evaluation of its significance and limitations has been narrowly focused on the degree to which it approximated—or fell short of—modern natural history. Moon-Kee Kim identifies a common limitation shared by these foundational texts of eighteenth century Joseon ichthyological *myeongmulhak*—including *Jasaneobo* and *Jeoneoji*—noting their exclusive reliance on textual descriptions rather than utilizing iconography for the characterization and identification of species. This approach stands in sharp contrast to the contemporary Japanese context; in representative Japanese natural history texts of the era, such as Kurimoto Tanshū 栗本丹洲 (1756–1834)'s *Risshi Gyofu* 栗氏魚譜 and Terajima Ryōan 寺島良安 (1654–?)'s *Wakan Sansai Zue* 和漢三才圖會, realistic visual representations were actively and systematically implemented for a diverse range of fish species.⁵ Furthermore, there were also attempts to uncover the empirical methodologies and epistemologies of early modern Europe within the empirical knowledge embedded in ichthyological treatise such as *Jasaneobo*.⁶

Nevertheless, interpreting late Joseon *myeongmulhak* using criteria derived from Western natural history, such as naturalistic representation and empirical epistemology, fundamentally risks historical decontextualization. Furthermore, this issue becomes all the more pronounced when considering the insight that values like representational objectivity in early modern European natural history atlases were not universally valid truths, but rather products of European history.⁷ Recent

⁴ Moon-Kee Kim, “Jasan-Urbo and Haejok-doseul: The Divergence of Natural History about Fishes in Early Modern East Asia 『玆山魚譜』와 『海族圖說』: 근세 동아시아 어류박물학의 갈림길,” *History and Boundaries* 역사와 경계 101 (2016), 67–137; idem., “The Influence of Wakasanai-zue on the Natural History of Fishes in Jeoneoji 『전어지』의 어류박물학과 『화한삼재도회』,” *Ming-Qing Historical Studies* 명청사연구 48 (2017), 115–183; Sang-ho Ro, “The Knowledge and Records on Animals in the Late Chosŏn Period: A Case of Carnivora in Korean Peninsula 조선 후기 동물에 대한 지식과 기록: 한반도 서식 식육목(食肉目, Carnivora)의 사례를 중심으로,” *Korean Studies* 한국학연구 60 (2017), 5–48; idem., *Neo-Confucianism and Science in Korea: Humanity and Nature, 1706–1814* (Abingdon, Oxon: Routledge, 2021), Chap. 4.

⁵ Kim, “Jasan-Urbo and Haejok-doseul: The Divergence of Natural History about Fishes in Early Modern East Asia”; idem., “The Influence of Wakasanai-zue on the Natural History of Fishes in Jeoneoji.”

⁶ Ro, *Neo-Confucianism and Science in Korea*, 69–90.

⁷ Around the turn of the millennium, the concept of “historical epistemology” emerged within the Western community of historians of science. The core of this concept lies in the insight that elements long presumed as foundational premises in the study of the history of science—namely, the realistic representation of objects, objectivity, and the laudation of intellectual curiosity, all of which have been conventionally linked to scientific universality—were in fact configured

literature offers a critical reevaluation, investigating the synthesis and application of empirical knowledge within the *kaozhengxue* traditions characteristic of late Joseon ichthyological treatises.⁸

Building on this critical perspective, the present research advances an alternative historical understanding of late Joseon *myeongmulhak* from a more fundamental dimension. Specifically, it argues that the discipline was not solely dedicated to pursuing textually or empirically accurate knowledge of external objects in and of itself; rather, it possessed the characters of information serving specific purposes and functions. To be sure, prior literature was not entirely devoid of considerations regarding this point. However, previous studies have generally attributed a vague sense of practicality to the field, failing to empirically elucidate the precise nature of the practical utility that specific works of *myeongmulhak* sought to achieve.

To achieve this objective, this study analyzes Seo Yu-gu's *Gongmyeonggo* 穀名攷 (Treatise on the Names of Grains). He is widely known for compiling the *Imwongyeongjeji*, a vast encyclopedia that systematized useful techniques and knowledge for contemporary rural society. Among these, agricultural technology was treated as a domain of paramount importance. The *Gongmyeonggo*, which distinguishes various cereal grains and investigates their names and characteristics, constitutes one of the key treatises within this larger endeavor. In the West, animal anatomy developed continuously since antiquity, leading to the view that animal volition—which drives muscular movement—was the core capacity elevating animals above plants.⁹ On the other hand, according to Derk Bodde, interest in plants—particularly grains—rather than animals has long been paramount in China.¹⁰ This observation holds true not only for China but also for the Korean Peninsula, where agrarian civilization has persisted since antiquity. Notably, since the eighteenth century, several scholars of the Joseon Dynasty began referencing Chinese agricultural texts to apply them to local agricultural practices or to conceptualize agricultural reforms. Seo Myeong-eung 徐命膺 (1716–1787), the grandfather of Seo Yu-gu, further expanded this endeavor comprehensively, presenting a systematic framework that could well be termed an East Asian

through the specific and contingent historical trajectory of the early modern West. Lorraine Daston, “Historical epistemology,” in James K. Chandler, Arnold Ira Davidson & Harry D. Harootunian (eds.), *Questions of Evidence: Proof, Practice, and Persuasion Across the Disciplines* (Chicago: University of Chicago Press, 1994), 282–289; Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2010), 55–114.

⁸ Zexing Zheng, “The ‘Naming and Textual Research’ in the Books of Fishes in the Late Chosŏn Dynasty and the Knowledge Circulation in East Asia 조선 후기 어보(魚譜)의 ‘명물고증’ 작업과 동아시아의 지식 유통,” *Korean Studies Quarterly* 한국학 46:1 (2023), 353–392.

⁹ Shigehisa Kuriyama, *Divergence of Greek and Chinese Medicine* (New York: Zone Books, 1999), Chap. 3.

¹⁰ Derk Bodde, *Chinese Thought, Society, and Science: The Intellectual and Social Background of Science and Technology in Pre-Modern China* (Honolulu: University of Hawaii Press, 1991), 311.

agricultural compendium.¹¹ Seo Yu-gu's framework of agricultural technology constituted a continuation of his grandfather's project. In this respect, *Gongmyeonggo* is highly likely to manifest the paradigmatic features of late Joseon *myeongmulhak* more distinctly than treatises on ichthyology.

Here, it is necessary to compare *Gongmyeonggo* with *Jeongyojeon gugok gobyen* 程瑤田九穀攷辨 (Critical Verification of Zheng Yaotian's Study of the Nine Grains), another treatise by Seo Yu-gu on the *myeongmulhak* of grains. In this treatise, he critically reexamined and verified *Gugokgo* 九穀攷 (Treatise on the Nine Grains) by Zheng Yaotian 程瑤田 (1725–1814) of the Qing Dynasty.¹² This essay serves as a classic exemplar demonstrating the influence of *kaozhengxue*, corresponding to the first trend among the characteristics of late Joseon *myeongmulhak* discussed earlier. By philologically analyzing textual evidence and clarifying usage patterns of names of “Nine Grains” across Chinese classics, this identification of the specific botanical entities showcased Seo's scholarly prowess as a prominent member of the contemporary *gyeonghwasajok* 京華士族 (urban scholar-official elite).¹³

Meanwhile, *Gongmyeonggo* identified a diverse array of grain varieties in practical use across contemporary agricultural fields in both Joseon and China. To achieve this, it actively integrated not only textual literature but also the empirical, on-site knowledge of veteran farmers. *Gongmyeonggo* was initially included in *Haengpoji* 杏浦志, a work compiling the agricultural technologies that Seo experimented with and investigated through practical farming during his eighteen-year rural retirement (1806–1823) following his departure from officialdom; it was subsequently recompiled into *Bonliji* 本利志 (Treatise on Grain Agriculture) within *Imwongyeongjeji*.¹⁴ In this regard, *Gongmyeonggo* can be understood as

¹¹ Yong-seop Kim, *Studies in the Late Yi Dynasty Development of Agricultural Discourses* 조선후기농학사연구 (Paju: Jisiksaneopsa, 2009), 317.

¹² Yu-sub Bu, “The Study about the Naming and Textual Research of Seo Yu-gu - Focusing on *Jeong yo-Jeon Gugokgobyun* 서유구의 명물고증학에 대하여-程瑤田九穀攷辨 을 중심으로,” *Hanmunhakbo* 한문학보 51 (2024), 205–248.

¹³ Since the eighteenth century, a new contingent of elites emerged in Joseon, centered around Seoul, to lead novel academic and cultural movements. Demonstrating an open attitude toward the material culture of Qing China—which traditional Joseon intellectuals had long rejected as barbarian—they utilized these cultural resources to establish themselves as the dominant faction of their time. This group is referred to as the *gyeonghwasajok*. Since Seo Myeong-eung, the family of Seo Yu-gu was among the top-tier *gyeonghwasajok*, and Korean scholarship that examines Seo Yu-gu's academia and thought from this specific perspective has been widely recognized. For the most representative study in this regard, see Bonghak Yu, *A Study on Northern Learning of Yeonam School* 연암일파 북학사상 연구 (Seoul: Iljisa, 1995).

¹⁴ In the preface to *Haengpoji*, written in 1825, Seo Yu-gu stated that he had actively engaged in agricultural labor during his rural retirement (“余也跡蟄畊畝, ... 田家作苦, 積有經驗”). Furthermore, within *Gongmyeonggo*, multiple citations explicitly credit not only textual sources but also veteran farmers (“間附以余之所訪得於老農者焉”) when explaining Joseon's grain varieties. These references indicate that during his eighteen-year rural life, Seo developed an identity dis-

representing the second trend in late Joseon *myeongmulhak*—namely, an attempt to identify existing external entities through empirical knowledge in addition to textual literature.

The following section first examines the critical challenges that emerged in Joseon agriculture—specifically in wet-rice cultivation—beginning in the seventeenth century, alongside sustained efforts undertaken to mitigate them. Against this historical backdrop, it explores the emergence and significance of Seo’s technological framework for agriculture around the turn of the nineteenth century. Ultimately, this analysis elucidates the practical utility that he sought to achieve in wet-rice farming through his treatise, *Gongmyeonggo*.

To more effectively interpret the utility of *Gongmyeonggo*, this study proposes the conceptual framework of a *toolbox*. Analogous to an artisan’s toolbox equipped with necessary implements to resolve technical challenges, this paper demonstrates that the *Gongmyeonggo* functioned as a repository of information designed to provide alternative seed varieties capable of withstanding potential crises and disasters encountered across diverse agricultural settings. In doing so, this study concurrently analyzes the *Ohaego* 五害攷 (Treatise on the Five Disasters)—another essay in which Seo surveyed the five major agricultural hazards—to investigate the specific disasters these alternative solutions were intended to mitigate.¹⁵

Challenges and Alternative Approaches in Wet-Rice Cultivation on the Korean Peninsula as Reflected in Joseon Agricultural Treatises

From the fifteenth century onward, the development of rice cultivation on the Korean Peninsula underwent a significant transformation. Notably, among the wet-rice farming practices that had been expanding previously, a new agricultural technique began to gain widespread traction. This method—involving the cultivation of rice seeds into seedlings in a dedicated nursery before transplanting them into flooded paddy fields—was variously termed *sapjong* 插種, *myojong* 苗種, or *iang* 移秧 (transplanting method). Although this technique substantially enhanced productivity by economizing weeding labor, it entailed the critical risk of crop failure if adequate water resources were not secured during the transplanting season around May. Given

tinct from his status as a member of the ruling class—a self-conception aligned with the production-oriented stratum. Indeed, in the preface, he explicitly defined himself as one of the governed class(“固治於人而食人之類耳”). Emphasis added.

¹⁵ Like *Gongmyeonggo*, *Ohaego* was initially included in *Haengpoji*, and was subsequently re-incorporated into *Bonliji*. Hereafter, all citations from two treatises are drawn from the recently collated and punctuated edition of *Bonliji* by the Imwongyeongje Research Institute.

the climatic traits of the Korean Peninsula, where spring droughts characteristically precede the summer rainy season, this method was initially discouraged.¹⁶

Indeed, *Nongsajikseol* 農事直說 (Straight Manual on Farming)¹⁷, the paramount official agricultural treatise of the early Joseon period, explicitly articulated this caveat. The section titled “Jongdo” 種稻 (Planting Rice), which outlines general rice cultivation in *Nongsajikseol*, opens with the statement, “There are early-maturing rice and late-maturing rice” (*Jongdo yujo yuman* 稻種有早有晚). This classification criterion is closely linked to the subsequent categorization of rice cultivation methods, namely *sugyeong* 水耕 (direct sowing in wet fields), *geongyeong* 乾耕 (direct sowing in dry fields), and *sapjong*.¹⁸

Among these three methods of rice cultivation, *sugyeong* is introduced first and presented as the standard cultivation practice. *Geongyeong*, described next, was an alternative method designed for instances when spring droughts persisted and rendered *sugyeong* unfeasible; for this method, instructions dictated that the rice seeds to be sown must invariably be *mando* 晚稻 (late-maturing rice).¹⁹ Furthermore, *hando* 旱稻 (upland rice) was categorized separately as a variety capable of being cultivated in high-altitude areas where water temperatures were low yet the soil was not excessively dry.²⁰ Therefore, the classification of *jodo* 早稻 (early-maturing rice) versus *mando*, as well as *hando*, based on growth periods and geographical conditions, was established not merely as a natural historical criterion derived from ecological variations of rice, but rather as a category intimately linked to the specific rice-cultivation practices viable under local environmental conditions.

Sapjong presented as the third rice cultivation method in *Nongsajikseol*. While it renders weeding operations far more manageable compared to direct sowing methods, it was evaluated as a hazardous farming practice that could result in total crop failure should it encounter a severe drought during the transplantation season.²¹ This perspective subsequently became the foundational policy of the Joseon court.

Although the transplanting method was regarded as a highly problematic agricultural practice, its inclusion in the *Nongsajikseol*—coupled with its steady proliferation starting from southeast region of Korean Peninsula, which necessitated the strengthening of later prohibitions—suggests that this phenomenon carries significance beyond the mere development of Joseon’s agriculture and subsequent

¹⁶ Jeongseop Yeom and Soonyeol Soh, *Agricultural Techniques and Korean Civilization* 농업기술과 한국문명 (Paju: Deullyeok, 2021), 219–224.

¹⁷ Following its initial publication in 1429, it established itself as the representative government-sanctioned agricultural treatise of the Joseon Dynasty.

¹⁸ “耕種法有水耕【鄉名水沙彌】，有乾耕【鄉名 乾沙彌】，又有插種【鄉名苗種】.”: *Nongsajikseol*, Jongdo 種稻, Bu hando 附旱稻

¹⁹ “春旱不可水耕，宜乾耕【唯種晚稻】”: *ibid*.

²⁰ “稻種甚多，大抵皆同，別有一種曰旱稻【鄉名山稻】，偏宜於高地及水冷處，然土大燥則不成.”: *ibid*.

²¹ “苗種法，擇水田雖遇旱不乾處，二月下旬至三月上旬可耕。... 【此法，便於除草，萬一大旱則失手，農家之危事也。】”: *ibid*.

productivity growth conventionally posited by Korean academia.²² Rather, greater scholarly attention should be directed toward the pivotal factors—specifically the concrete aspects of technical responses—that facilitated the adoption of this method in the face of adverse environmental conditions and institutional barriers.

A clearer understanding of this issue may be derived from the analysis of rice cultivation protocols articulated in private agricultural treatises, as opposed to official state-sponsored publications. With the widespread adoption of the rice transplanting method in Joseon since the 17th century, significant technical breakthroughs were proposed in privately compiled agricultural treatises such as *Nonggawollyeong* 農家月令 (c. 1619), *Nonggajipseong* 農家集成 (1655) and *Sallimgyeongje* 山林經濟 (c. 1706). A noteworthy development was focused on developing and identifying diverse *mando* variety to prepare for extended spring droughts, which compel farmers to maximize the postponement of the rice-transplanting period or adopt *geongyeong*. While *Nongsajikseol* merely prescribes that *geongyeong* must be implemented exclusively with late-maturing rice, *Nonggawollyeong* further categorizes and specializes these late-maturing varieties. It specifies that if irrigation conditions are not met by *ipha* 立夏 (around May 6 in the solar calendar), *mildaljo* 密達組 should be sown; if conditions remain unfavorable even until *soman* 小滿 (around May 21), *yumowaejo* 有毛倭租 or *hongdo* 紅稻 must be planted instead.²³

The implications of utilizing these specific rice cultivars are manifest: they enable rice cultivation even if the planting occurs significantly later than *cheongmyeong* 清明 (around April 5), which was conventionally recognized as the standard sowing period for *geongyeong*. By securing rice varieties that allow for a flexible transition to *geongyeong* even at a delayed sowing date, farmers could avoid total crop failure when delayed rainy seasons impeded water procurement during the critical transplanting period. Consequently, mitigating the inherent risks of the rice

²² Such an understanding has gained widespread acceptance following the comprehensive scholarly contributions of Yong-seop Kim, who extensively researched the agricultural history of the Korean Peninsula from antiquity. For the spread of the transplanting method in Joseon, see the following study. Yong-seop Kim, “Wet-Rice Cultivation Technology in the Late Joseon Period - On the Dissemination of the Transplanting Method 조선후기의 수도작기술-이앙법의 보급에 대하여,” *Aseayeongu* 아세아연구 7 (1964), 51–78.

²³ Seonggi Min, “*Nongga Wollyeong* and Sixteenth-Century Agricultural Practices 농가월령과 16세기의 농법,” *History and the world* 역사와 세계 9 (1985), 265–295; Miyajima Hiroshi, “The Development of Rice Farming in the Korean Peninsula 朝鮮半島の稲作展開,” *The Expansion of Asian Rice-Cultivating Culture: The History of Rice in Asia 2* アジア稲作文化の展開: 稲のアジア史 2 (小學館, 1987). These literatures also noted other technical breakthroughs, including the development of agricultural implements—such as *sibibeonji* 시비번지 and *salbeonji* 살번지—designed to prevent moisture evaporation and facilitate germination, as well as advancements in fertilization techniques aimed at effectively promoting seedling growth within the framework of the rice transplanting method.

transplanting method through these cultivars played a pivotal role in the widespread diffusion and adoption of this highly effective yet high-risk agricultural practice.

Agricultural Reform Agendas around the 19th Century and Seo Yu-gu's endeavor

The expansion of wet-rice cultivation—especially the transplanting method—persisted throughout the eighteenth century, extending its geographic reach to the central region in the Korean Peninsula. Owing to climatic conditions in which the rainy season arrived later than in the southern region—thereby inevitably prolonging spring droughts—this area was chronically more vulnerable to agricultural disaster, even in the absence of severe weather anomalies. In response to this issue, contemporary concerns coexisted alongside proposed solutions. An illustrative case in point is found in Seo Yu-gu's *Bonliji*, where he cited the concerns of Park Je-ga 朴齊家 (1750–1805)'s *Bukhagui* 北學議—a prominent work of the *bukhak*—acknowledging the validity of his perspective while simultaneously forecasting that the proactive construction of irrigation infrastructure could effectively resolve the problem.²⁴

Irrigation facilities were regarded as a more reliable means to secure the stability of wet-rice cultivation. In the *Gwonnongjeong gunongseo yuneum* 勸農政求農書 綸音—hereafter *yuneum*—of 1798, issued to solicit nationwide opinions for resolving agricultural challenges, King Jeongjo 正祖 (r. 1776–1800) of the Joseon Dynasty designated irrigation infrastructure as the paramount priority among the three core pillars of agricultural administration.²⁵ Responding to this royal initiative, Seo, who was serving as the magistrate of *Sunchang* 淳昌 in *Jeolla-do* 全羅道 at the time, submitted a memorial to the throne, demonstrating exceptional concern for agricultural affairs. It is noteworthy that, despite holding a position as a local official, he expressed views that placed greater emphasis on the practical, on-site application of agricultural techniques rather than merely focusing on the policy aspects of agriculture.²⁶

²⁴ “大約漢水以北，水田不可多。... 至於漢北則高句麗也，統合之後，見南人之食稻，從而效之。是欲移江、淮風俗於高句麗也，其可乎？畿東之歲比不登，職由於此。《北學議》按：此論未必然。獨不聞史起之引漳水灌鄴，... 爲之在人，不在於地。”： *Bonliji* 本利志, Byeonyang 辨壤, *Dongguktopum* 東國土品, Paryeokchongnon 八域總論 [Seo Yu-gu 서유구, Imwon gyeongjeyeon-guso 임원경제연구소 tr., *Imwongyeongjeji Bonliji 2* 임원경제지 본리지 2 (Paju: Pungseongmunhwajaedan, 2026), 64–65. (Hereafter *Bonliji 2*, the same applies with *Bonliji 3*).

²⁵ “其要則亦惟曰興水功也、相土宜也、利農器”： Hongjaejeonseogwonisipgu 弘齋全書卷二十九, *Yuneumsa* 綸音四, *Gwonnongjeong gunongseo yuneum* 勸農政求農書 綸音

²⁶ Seunghyun Oh 오승현, “Methodology for Intensive Agriculture: Seo Yu-gu's Rationalization of Agricultural Technology 정농(精農)을 위한 농술(農術): 토양, 풍토, 농시를 중심으로 본

His interest in irrigation facilities subsequently led to efforts toward the dissemination of water wheels. In *Bonliji*, he comprehensively cataloged 29 types of traditional irrigation facilities and 22 types of mechanical water wheels, including Western-style water-lifting devices introduced through Chinese literature. Some of these were actually put into practical use during his tenure as the Governor of *Jeolla-do* from 1833 to 1834, and he even formulated plans to operationalize the *Jaseungcha* 自升車 (an automated water-lifting device) conceived by Ha Baek-won 河百源 (1781-1845).²⁷

However, the utility of irrigation facilities remained limited, largely because their construction and upkeep required immense capital and continuous labor and maintenance. Traditional society could not always guarantee the agents or financial resources capable of sustaining such undertakings; furthermore, even when these conditions were met, such projects frequently engendered social conflicts and inequalities.²⁸ On the other hand, the late-maturing strategy for rice cultivation—which could mitigate the risks of the transplantation method and thereby further promote its spread—remained a highly viable option within the reality of agricultural practice at the time, where smallholder farming was prevalent. Having experienced these rural realities firsthand through 18 years of rural life, Seo sought to secure a diversity of rice varieties that could be utilized in such strategies and cope with a broader array of disaster scenarios. The tangible outcome of these efforts was *Gongmyeonggo*.

In his work *Gongmyeonggo*, he classified grains into three major categories: *gaejongnyu* 溉種類 (irrigated crops), *yukjongnyu* 陸種類 (upland crops), and *bu yeosaenggongmyeong* (附) 稻生穀名 (supplementary wild grains). Notably, while upland crops comprising 22 different types of grains were differentiated into 148 specific varieties, irrigated crops—which consisted exclusively of rice—were identified in 171 distinct varieties.²⁹ This discrepancy reflects the fact that as the late Joseon period progressed, wet-rice cultivation spread extensively, establishing rice

서유구의 농업 기술론,” *The Korean Journal for the History of Science* 한국과학사학회지 43:3 (2021), 715–759 on 729–731.

²⁷ Jongwook Jeon 전종욱, *Imwon-gyeongje-ji and Joseon's Everyday Technology* 임원경제지와 조선의 일용기술 (Paju: Deullyeok, 2022), 289.

²⁸ For further discussion on this matter, see the following study: Wongyu Choe 최원규, “Irrigation Infrastructure and Management Issues in the Late Joseon Dynasty 조선 후기 수리기구와 경영문제,” *Guksagwannonchong* 국사관논총 39 (1992), 211–263; Min Woo Lee 이민우, “Private Occupation of the Agricultural Irrigation Facilities and Conflict of Water Resources Fee in Nineteenth Century 19세기 수리시설의 사점(私占)과 수세(水稅) 갈등,” *Hanguksaron* 한국사론 55 (2009), 59–121. This does not imply that the construction and operation of irrigation facilities were invariably fraught with difficulties. Indeed, there are numerous instances where these systems were managed successfully through a harmonious integration of the heroic initiative of technically skilled individuals and the collaborative efforts of local rural communities. Nevertheless, unsuccessful cases were also widespread.

²⁹ Jeon, *Imwon-gyeongje-ji and Joseon's Everyday Technology*, 165–166.

as the most important crop. Furthermore, there was a heightened necessity for a particularly meticulous classification of rice. Due to its ecological characteristics, wet-rice cultivation is significantly influenced by microclimates, making finely-tuned techniques paramount to agricultural success.³⁰ In this regard, the system of identifying a diverse range of rice cultivars does not merely signify an attempt to improve productivity; rather, it reflects a historical context in which securing technical alternatives to adapt to diverse local environments, hydrological conditions, and natural disasters was deemed more critical.³¹ Viewed from this perspective, Seo's compilation in *Gongmyeonggo* can be understood as a functional *toolbox* designed to provide a wide array of technical alternatives.

To understand how *Gongmyeonggo* functioned as a functional *toolbox* through the identification of diverse rice cultivars, it is first necessary to examine how the foundational framework for classifying these cultivars was established within the text. Seo presents the primary categories of classification at the very beginning of the *Do 稻* (rice) entry in *Gongmyeonggo*:

Among rice cultivars, those that ripen early are referred to as *seon* 秈 (early-maturing rice), while glutinous varieties are designated as *na* 糯. Non-glutinous varieties are termed *gaeng* 秈 or 稭. ... Upland rice, which is cultivated in dry soil, is referred to as *yukdo* 陸稻 or *hanreung* 旱稜; it is also designated as *hanjeom* 旱占 on the grounds of its origin in Champa (the southern region of contemporary Vietnam).³²

His revised category adopted the fundamental classification system for rice varieties found in Joseon agricultural texts since the publication of *Nongsajikseol*, while additionally incorporating the taxonomy of non-glutinous rice and glutinous rice. In this light, his endeavor in *Gongmyeonggo* to identify and document a diverse array of cultivars while maintaining the existing taxonomy can be understood as an

³⁰ Clifford Geertz explained the stability and durability of agricultural production based on the unique micro-ecology of the wet-rice paddy (sawah) in Java, Indonesia. These characteristics can be realized through meticulously devised cultivation techniques. Similarly, Francesca Bray notes that finely-tuned methods in wet-rice farming are crucial components for enhancing productivity. She argues that skill-oriented technology is a core characteristic of East Asian rice cultivation, which distinguishes it from Western agriculture that has traditionally relied on mechanical technology. Clifford Geertz, *Agricultural Involution: The Processes of Ecological Change in Indonesia* (Cambridge: Cambridge University Press, 1963), 28–37; Francesca Bray, *The Rice Economies: Technology and Development in Asian Societies* (Oxford; New York: Blackwell, 1986), 113–116.

³¹ Since eighteenth-century advancements in regional agricultural practices on the Korean Peninsula correlate closely with the finely-tuned techniques of wet-rice cultivation. Jeongseop Yeom 염정섭, *Agricultural Development in Joseon 조선시대 농법 발달 연구* (Seoul: Tachaksa, 2002), 400–401.

³² “稻之早熟者曰秈; 黏者曰糯; 【俗作糯。】不黏者曰秈, 亦曰稭。... 厥或有陸種者曰陸稻, 曰旱稜; 來自占城曰旱占”: *Bonliji* 本利志, *Gongmyeonggo* 穀名攷, Gaejongnyu 漑漑類, *Do 稻* [*Bonliji* 3, 153].

extension of the risk-mitigation strategies traditionally coupled with expanding the transplanting method since the preceding eras.

Establishing the Nomenclature of Rice Cultivars with Accommodating Empirical Field Knowledge

Within wet-rice farming, the practice of securing diverse rice varieties as a risk-aversion strategy cannot be accomplished merely by obtaining the cultivars themselves. In reality, even with a wide array of seeds present in farming localities, an inability to accurately identify them due to a lack of established nomenclature hinders their situational application. Acknowledging this problem, Seo advocated for the necessity of ensuring a precise correlation between individual rice varieties and their correct names.

While the rice varieties of our country number in the dozens or even hundreds, they have all been transmitted through disparate regional dialects. Despite being the exact same grain, they were named differently in the past compared to the present, and a single variety was called by different names in the south and the north. Consequently, these names have blended with vulgar vernacular and passed down without coherence, rendering them impossible to comprehend. Referencing the rice cultivars enumerated in Kang Hui-maeng 姜希孟 (1424–1483)’s *Geumyangjaprok* 衿陽雜錄 and Yu Jung-lim 柳重臨 (1705–1771)’s *Jeungbosallingyeongje* 增補山林經濟, I have now correctly clarified and recorded them as follows, occasionally interspersed with insights I obtained by seeking out and interviewing nonong 老農 (experienced veteran farmers).³³ (emphasis added)

This problematic shares similarities with the perspectives of the elite agricultural reformists of the era, yet it reveals fascinating differences. A comparison can be made with the discussion raised by Park Je-ga in the “Gongmyeong” 穀名 (grain names) chapter of *Jinsobon bukhagui* 陳疏本北學議.³⁴

At present, the nomenclatures of grains have been transmitted entirely through regional dialects, leading to distinct designations between the southern and northern regions, while historical and contemporary titles remain disparate. Consequently, a single entity is passed down under various names, rendering its true meaning impossible to comprehend. It is therefore entirely fitting that an

³³ “吾東稻品，無慮累千百種，皆以方言相傳，一物也，而古今殊號，一類也，而南北異稱，哇哩凌雜，轉不可訓。今以姜希孟衿陽雜錄·柳重臨增補山林經濟，所列稻品參攷，證正錄之如左。而間附以余之所訪得於老農者焉。” : *Bonliji*, Gongmyeonggo, Gaejongnyu, Do (*Bonliji* 3, 153).

³⁴ In response to King Jeongjo’s *yuneum*, Park Je-ga authored the *Jinsobon bukhagui*, which expanded upon the agricultural discussions of his original *Bukhagui*.

erudite scholar be tasked with tracing the original characters to establish a standardized nomenclature.³⁵

While Park Je-ga prioritized establishing a standardized nomenclature to clearly identify the physical realities of rice cultivars, Seo similarly deemed the domestic practice of calling the identical variety by disparate names across different periods and regions to be irrational and sought its rectification. In doing so, Seo expanded the identification of rice varieties beyond mere reliance on written documents, proactively seeking out and capturing undocumented cultivars through interviews with experienced farmers. Furthermore, by dual-listing the vernacular names in the Korean script, he further augmented the practical tools for cultivar identification[Figure 2].³⁶ In this regard, it can be argued that Seo demonstrated a greater consideration for actual field utility in agricultural practice than Park Je-ga.³⁷

Specifically, let us take the two rice varieties identified by Seo—*cheongyodo* 泉橋稻 and *sando* 山稻—as examples to examine how he differentiated their characteristics. These two varieties were mentioned by Kim Yang-jik 金養直, a former local administrator who, responding to King Jeongjo's *yuneum*, highlighted the tacit knowledge of experienced farmers and argued that regional agriculture should be entrusted to them. According to Kim, distinguishing between these two rice varieties relied entirely on the seasoned expertise of such veteran farmers.³⁸

The two rice varieties exhibited no discernible difference regarding the absence of awns, rendering their differentiation highly challenging. Given that Kim Yang-jik cited the distinction between these two varieties as an illustrative case while emphasizing the autonomy of local agricultural practices—which relied exclusively on the peerless expertise of experienced farmers—it can be inferred that identifying these varieties in actual agricultural settings was considerably difficult. For these varieties, Seo provided explanations on the variations in coloration across different growth stages to facilitate their identification. For *cheongyodo*, he explicitly noted that the data was retrieved directly from the field rather than from extant literature,

³⁵ “今穀名皆以方言相傳，南北不同，古今殊謂。一物異號，轉不可訓。宜令博雅者尋出本字，定其名”：Park Je-ga 朴齊家, *Jinsobon bukhagui* 陳疏本北學議, Gongmyeong 穀名

³⁶ In eighteenth and nineteenth century Joseon, as an extension of the *sojunghwa* 小中華 (Lesser Sinocentrism) ideology, certain thinkers posited that both oral and written modalities must be completely transitioned to Chinese—thereby rejecting the vernacular—in order to properly establish the relationship between words and things. Among these proponents, Park Je-ga articulated the most resolute position. Oh, “Methodology for Intensive Agriculture,” 737.

³⁷ Park Je-ga explicitly manifested his distrust toward experienced elderly farmers, an attitude that inherently entailed a devaluation of their empirical, experience-based knowledge. “今之老農不可信”：Park Je-ga 朴齊家, *Jinsobon bukhagui* 陳疏本北學議, Nonong 老農

³⁸ “故老農知此，隨宜以耕，得其地利。故利於野者，不利於峽，宜於燥者，不宜於濕。山稻種於乾田，泉橋種於寒水。村村異種，邑邑殊農。臣願以生於其鄉，長於某[其]鄉，知某田可藝某穀，某畝可稼某稻者，從其鄉之所願，定爲一鄉之農老，以勸其農，庶幾有補於農功。”：Kimyongjik sangso 金養直 上疏, *Seungeongwonilgi* 承政院日記 (Diaries of the Royal Secretariat), Jeongjo 23 (1799) 3. 28.

classifying it as a late-maturing rice variety while specifying its typical upland rice characteristics suited for cold water environments in mountain valleys. Meanwhile, regarding *sando*, he described its properties as an upland rice variety adapted to arid soil conditions that requires early sowing. Therefore, while both varieties could be considered for cold-water regions in mountain valleys, it was imperative to accurately distinguish between them and select seeds based on the specific conditions of the cultivation site (paddy or dry field) and the sowing period (late-maturing or early-maturing rice). Through this approach, Seo sought to convert the field-based tacit knowledge of experienced farmers into a communicable format for rural elites.



Figure 1. *sando* 山稻 (Source) *Ubo Farm*, located in Gyeonggi Province Korea, has been conducting a project dedicated to the restoration and cultivation of traditional, indigenous rice varieties. This photograph, provided by *Ubo Farm*, was featured in *Bonliji* 3, 174.

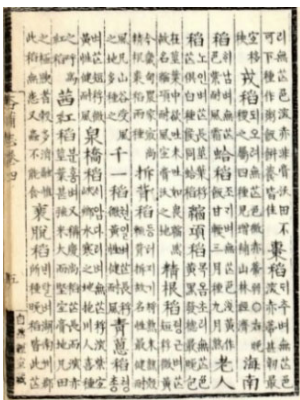


Figure 2. Each Sinitic nomenclature for the rice varieties in Joseon was accompanied by its corresponding vernacular Korean name in parallel, followed by an explanatory (Source) Seo Yu-gu, *Haengpoji*, “Gongmyeonggo” <http://kostma.korea.ac.kr/> (Center for Overseas Resources on Korean Studies, Korea University).

Table 1. Comparison of *cheongyodo* and *sando* based on the explanations in *Gongmyeonggo*

Varieties of rice	Description	Classification / Source
<i>cheongyodo</i> 泉橋稻 (folk name: 수 암다리벼) ³⁹	It is awnless, and its husk is of a deep purple hue. It is well-suited for cold-water terrains in mountain valleys. The inhabitants of <i>Pocheon</i> favor its cultivation and refer to it as <i>hongdo</i> 紅稻 (red rice).	Late-maturing rice / Non-textual vernacular sources
<i>sando</i> 山稻 (folk name: 산도) ⁴⁰	It is awnless. Upon its initial heading stage, the panicle exhibits a verdant coloration, which subsequently transitions to a pale white hue at maturation. Possessing a resilient and robust disposition, it demonstrates significant wind resistance and thrives even in barren soils, adapting well to early sowing. ... It is seldom cultivated in the hydrological zones of the southern provinces, and while occasionally grown in the arid terrains of the northern regions, its cultivation remains infrequent there as well.	Upland rice / <i>Geumyangjaprok</i>

Diversifying Disasters and the Expansion of Rice Variety Diversity

Seo’s rice variety elaboration project, as manifested in the *Gongmyeonggo*, was not confined strictly to Joseon cultivars but also encompassed Chinese varieties. This scope constitutes a peerless characteristic among Joseon agricultural treatises. Therefore, rather than merely evaluating this as an intention to introduce advanced Chinese agricultural methods, a more concrete explanation is required regarding why he undertook such an unprecedented endeavor.

Seo himself was well aware that this attempt was exceptional. This is evidenced by the fact that after organizing the Joseon varieties in the introductory section of his

³⁹ “泉橋稻【수 | 암다리벼. 無芒, 稈深紫. 宜峽鄉水寒之地. 抱川人喜種之, 呼爲紅稻.】... 右晚稻之屬十一種, 新增.”: *Bonliji*, “Gongmyeonggo”, Gaejongnyu, Do (*Bonliji* 3, 169)

⁴⁰ “山稻【산도. 無芒. 初發穗時色青, 熟則微白. 性健耐風, 宜墾地, 早下種. ... 南方水鄉, 罕種之; 惟北地少水處, 時或蒔藝, 然亦不多有也.】... 右旱稻之屬二種, 見衿陽雜錄.: *ibid.* (*Bonliji* 3, 173)

taxonomy, and prior to systematically presenting the Chinese varieties, he emphasized the legitimacy of securing varietal diversity across national borders. Premised on the notion that under identical conditions, a harvest's success or failure hinges on seed selection, he believed that diverse seeds could be procured from beyond the borders (i.e., from China) and disseminated. Furthermore, by citing instances where various crops cultivated in a vast country like China originated from other regions, he asserted that the introduction of diverse Chinese varieties was entirely justified.⁴¹

Although he was the first to systematically incorporate Chinese rice varieties into an agricultural treatise, interest in these foreign cultivars had already been emerging both within the court and across society. The relevant discourse was primarily driven by the scholars of *bukhak*, a facet of which can be clearly observed in Park Je-ga's *Jinsobon bukhagui*

During the Song Dynasty, *jeomseongdo* 占城稻 (*Champa* rice) was cultivated; since it was harvested early before the onset of frost, crop failures could be averted. Currently, the rice seeds sown in the paddy fields of *Xishan* 西山 in Yanjing are all early-maturing varieties originating from south of the Yangtze River. If we purchase those rice seeds whenever we travel to Yanjing to receive the imperial calendar and subsequently sow them, it will undoubtedly yield extraordinary results.⁴²

Park Je-ga anticipated that introducing the early-ripening rice cultivars of China into Joseon would be highly advantageous for avoiding frost damage, drawing a historical parallel to the Song Dynasty's implementation of *Champa* rice from Vietnam.⁴³ Going a step further than Park's proposition, Seo concretely identified the specific rice cultivars proposed by Park and underscored their efficacy from an alternative perspective. In classifying Chinese rice varieties, Seo augmented the existing taxonomy by introducing double-cropping rice—a practice previously non-existent in Joseon. Within this category, he identified specific cultivars such as *gaehabaek* 蓋下白, *jeokdo* 撫稻, *yeongando* 輓稈稻, and *eomido* 御米稻. He

⁴¹ “擇種，爲農穡之第一義。諦樹之時同，藝之地同，蒔耨之功又同，而此穎而粟，彼稭而秬者，種有不同也。故種不可不擇。然其始，豈降自天哉？亦惟曰：‘購之廣，而傳之有方也。’故胡麻，自大宛來；占稻，自占城來；豌豆，自西戎來；蘆穰，自回回來。夫以中國之大，猶然，況吾東之僻處一隅乎！今考古今農書、各省地志，撮稻品之最著而可傳種者，敘之如左。黍稷以下倣此。”: *ibid.* (*Bonliji* 3, 175)

⁴² “宋時種占城稻，取其先霜早熟，能免災荒。今燕京西山水田種者，皆江南早稻種。每於黃歷 之行，質取傳種，必有異也。”: Park Je-ga 朴齊家, *Jinsobon bukhagui* 陳疏本北學議, Jongdo 稻種

⁴³ In the history of Chinese agriculture, the dissemination of *Champa* rice during the Song Dynasty—which substantially elevated rice productivity in the Jiangnan region—constituted a momentous event worthy of being characterized as the Green Revolution of traditional East Asia. See Joseph Needham and Francesca Bray, *Science and Civilisation in China* (Cambridge: Cambridge University Press, 1984), 492–493.

demonstrated a particular interest in *eomido*, leaving an exceptional record of two separate personal commentaries (按).

The primary tenets of his commentaries can be summarized as follows: first, Based on Chinese textual evidence, *eomido* can be harvested prior to the first frost even when cultivated in the vicinity of the fortieth parallel north; second, Cultivation is highly viable in the *Gwanbuk* 關北 region of Joseon, which is situated within a similar latitudinal zone; and third, *eomido* is the precise Chinese rice cultivar whose introduction was advocated by Park Je-ga; the adoption of this variety would facilitate double-cropping in the southern provinces of Joseon.⁴⁴

Both Park Je-ga and Seo anticipated that introducing *eomido* to Joseon would yield significant benefits by leveraging its unique characteristics. Unlike Park, however, Seo went beyond mere expectation by offering logical justifications for the potential introduction of seeds. Utilizing the concept of latitude-dependent climate and temperature gradients, he argued that the region in China where *eomido* was then cultivated lay around forty degrees north latitude—correlating with the *Guanbuk Yukjin* 關北六鎮 (Six Garrison Fortresses) region of Joseon. Thus, he presented a logic of compatibility, asserting that cultivation was entirely viable in the northern territories of Joseon. While previous scholarship has identified Seo's logic of compatibility in his application of China's soil classification system to Joseon, the present context reveals a perspective wherein the seed itself, rather than merely agricultural knowledge, is deemed compatible through the same reasoning. Furthermore, he projected that while *eomido* would serve as a useful early-ripening rice capable of being harvested prior to the early frosts in the north, its cultivation in the southern provinces in Joseon would enable double-cropping within a single year, mirroring the agricultural practices of the Jiangnan region in China.⁴⁵

Seo's motivation for introducing Chinese rice varieties was not confined merely to expanding rice cultivation into the *Guanbuk* region or attempting double-cropping in the southern provinces. Rather, as previously discussed, a more critical dimension lay in his endeavor to diversify risk-mitigation strategies against agricultural disasters. Within his work *Haengpoji*, Seo included the *Ohaego*, wherein he

⁴⁴ “幾暇格物編又云：“口外種稻...”口外山莊，即熱河山莊也。北近沙漠，去燕京四百餘里，極高四十餘度，與我國關北六鎮之地相直，而此稻能前白露收，亦一異也。宜購種廣播之。又按：朴齊家北學議云：“燕京西山水田種者...”余疑西山種者，亦此御米稻也。誠能歲歲購種廣播域中，則鐵嶺以北，皆可飯稻。若南方氣暖之地，又可以一年再藝，晦有倍蓰之收，其利豈不博哉！”： *Bonliji*, Gongmyeonggo, Gaejongnyu, Do (*Bonliji* 3, 192–194).

⁴⁵ Based on the logic of latitude-dependent climate and temperature gradients, Seo Yu-gu considered Chinese soil classification knowledge applicable to Joseon as well (See Oh, “Methodology for Intensive Agriculture,” 732–742). For him, this principle served as a key mechanism ensuring compatibility not only for foreign knowledge, but also for foreign seeds and crops. While this provided a logical framework to account for the compatibility of knowledge and crops, such a principle did not always yield functional outcomes in practice. Under this logic, Seo maintained that double-cropped rice and sugarcane could be cultivated in Joseon, a premise that proved factually incorrect.

classified agricultural disasters into five categories and analyzed their specific manifestations alongside corresponding countermeasures. The introductory section of the *Ohaego* comprises two thematic headings: “Agriculture Suffers from Five Disasters” (農有五害) and “Mixing Seed Varieties to Prepare for Disasters” (雜種備災害). What is particularly noteworthy here is the practice of polyvarietal cultivation—mixing diverse seed varieties—as a primary institutional countermeasure to minimize agricultural damage.

When encountering sudden disasters such as floods, droughts, windstorms, or locust infestations, it is impossible to anticipate whether one should cultivate late-ripening rice or early-ripening rice, or whether to plant drought-resistant varieties or moisture-tolerant ones. Yet, if two types of crops perish while three others are successfully harvested, would this not be far preferable to a total crop failure? It is precisely to this circumstance that the adage refers: “A mitigated disaster is preferable to an absolute one.”⁴⁶

This remark by Seo is presumably linked to the necessity of organizing and identifying not only the rice cultivars of Joseon but also those of China; furthermore, it serves as a poignant reminder of the significance of the *Gongmyeonggo* as a diverse technical *toolbox* designed for risk mitigation. In his subsequent discussion, the following passage underscores that the introduction and cultivation of Chinese rice cultivars are both vital and highly feasible measures for such risk reduction.

How could one possibly enumerate all such instances? If one purchases the seeds, plants them regularly, and tends to them in accordance with the proper seasons, why should there be any anxiety over disasters such as floods, droughts, wind damage, or frost damage? Some harbor doubts, contending that the climate and soil of our country are fundamentally disparate from those of China. However, such individuals fail to realize that the assertion of “incompatibility of climate and soil” (風土不宜) merely stems from the variance in temperature between the north and the south. Needless to say, the northern and western regions successfully produce soybeans and foxtail millet. Even when observing the rice cultivars of the Jiangnan region, the north latitude of Jiangnan stands at 32 degrees and 4 minutes, whereas the north latitude of the prefectures and counties situated along the coastal zones of the *Yeongnam* and *Honam* 嶺湖南 regions in our country is 34 degrees. How significant could the latitudinal temperature differential between these territories truly be?⁴⁷

⁴⁶ “水旱風蝗，縱值不虞，種桂燥濕。二耗三收，不猶愈乎全荒乎？‘害莫若輕’，此之謂也。”：Bonliji, Ohaego 五害攷, Chongnon 總論, Japjongbijaehae 雜種備災害 (Bonliji 3, 299).

⁴⁷ “若此類，何可勝數？苟能購種有素，而蒔藝及時，則何憂乎水旱風霜也？或疑吾東風土，不并于中州，是不知凡所云風土不宜者，祇由南北寒暖之不同耳，即無論西北豆粟之產。雖以江南稻種言之，江南極高三十二度四分，吾東嶺湖南沿海州郡，極高三十四度，其南北寒暖之相去，果幾何哉？”：ibid. (Bonliji 3, 300–301)

According to this, based on the latitudinal-climate and temperature principle, Chinese rice cultivars can also be cultivated in Joseon, thereby enriching repository of seed information as the technical *toolbox*. This was presented as a novel concept that challenged the contemporary conventional wisdom, which generally assumed that Chinese crops were incompatible with the climate and soil of Joseon.

The implications of introducing Chinese rice cultivars extend beyond these considerations; this measure was also proposed as an alternative solution to address the limitations of the disaster relief strategies emerging at the time. From the eighteenth century onward, as severe and protracted droughts became increasingly frequent, the conventional response of simply sowing late-maturing rice proved insufficient to overcome agricultural crises. Consequently, risk-aversion strategies involving the *daepa* 代播 (substitute sowing) of alternative crops in lieu of rice—most notably buckwheat—began to garner significant attention. Because buckwheat could be successfully harvested prior to the first frost even when sown as late as August, it became the most widely selected substitute crop.⁴⁸

Under these circumstances, Seo perceived a critical need to reconsider the conventional practice of relying exclusively on buckwheat for *daepa*. His perspective is clearly demonstrated in the eighth sub-entry, titled *Daepa Guhan* 代播救旱 (Overcoming Drought through Alternative Sowing), under the second section, *Suhanhae* 水旱害 (Flood and Drought Damages), of *Ohaego*. Regarding the practice of *daepa*, he cautioned against the conventional tendency to rely exclusively on a single method, asserting that “yet, even within this method of substitute sowing, strict principles apply: since optimal crop growth varies depending on the topography of the agricultural land and specific cultivars must be selected based on moisture levels, it is fundamentally impossible to discuss these practices through a single, uniform generalization.”⁴⁹

Seo did not problematize the practice of *daepa* itself; rather, he took issue with the conventional practice of indiscriminately selecting a single cultivar (buckwheat) as the sole alternative during drought, completely disregarding the diverse environmental conditions of the agricultural field. Reflecting upon his tenure as the magistrate of *Sunchang* in 1798, he recounted a catastrophic drought during which he executed the royal court’s policy of *daepa*, replacing the devastated rice crops in his

⁴⁸ *Joseonwangjosillok* 朝鮮王朝實錄 (The Veritable Records of the Joseon Dynasty) document over ten instances between 1780s and 1830s where buckwheat was utilized as a substitute crop due to extreme drought. While earlier records concerning tax exemptions for regions engaged in buckwheat farming permit the inference that this crop had already been cultivated as an alternative in drought-stricken areas, the frequent pairing of the term *daepa* with buckwheat—specifically appearing after 1782—allows for a compelling conclusion: during this period, severe droughts became increasingly frequent, and buckwheat firmly established itself as the quintessential crop for substitute sowing.

⁴⁹ “然代播亦有道，高下異宜，燥濕殊種，固不可一概論也。”: *Bonliji*, *Ohaego*, *Suhanhae*, *Daepa Guhan* (*Bonliji* 3, 312).

jurisdiction with buckwheat. However, due to torrential rains in late summer, the buckwheat—highly vulnerable to excessive moisture—was blighted, resulting in a total crop failure that subjected the local population to a severe famine. Drawing from this empirical failure, Seo advanced a critical alternative proposition.⁵⁰

*In retrospect, while the implementation of daepa was fundamentally correct, the specific crop selected for cultivation was highly inappropriate. Although our nation possesses an abundance of nomenclature and varieties of grain, the actual periods for sowing, weeding, and harvesting do not significantly deviate from one another. Among them, buckwheat and mung beans are the only crops capable of yielding a harvest when planted late. However, between these two species, one thrives in arid soil while rejecting moisture, and the other flourishes in barren land while failing in fertile soil. Disregarding these ecological properties, the authorities proceeded with a uniform implementation, resulting in exhaustive labor with zero harvest. Had we preemptively procured anomalous Chinese late-ripening cultivars—such as *hyangjaman* 香籽晚 of *De'an* 德安 or *Yuksibil* 六十日 of *Tongzhou* 通州【both of which are rice varieties that can be transplanted as late as the seventh lunar month】—how could such a disaster have transpired? Therefore, the extensive acquisition of superior crop cultivars constitutes the foremost and most urgent priority for mitigating the disasters of drought.⁵¹(emphasis added)*

This particular experience appears to have served as both a profound trauma and a critical lesson for him. The same account was not only compiled in *Ohaego* but was also reiterated almost verbatim in his *Uisanggyeonggyecheak* 擬上經界策 (Policy Proposals for the King)—written to advise King Sunjo 純祖—and in his official memorial (*sangso* 上疏) submitted to King Heonjong 憲宗 in 1838, during his tenure as *Daesahon* 大司憲 (the Inspector-General).⁵² A noteworthy aspect of Seo's discourse lies in his diagnosis that despite the apparent numerical diversity of Joseon's indigenous rice cultivars, their ecological variation regarding the timing of sowing, cultivation, and harvesting remained significantly narrow; based on this assessment, he recognized the imperative need for Chinese rice cultivars that could transcend these inherent limitations.

When interpreted through the framework of contemporary ecological and biological concepts, this implies that the agricultural disasters prevalent at the time were

⁵⁰ “正宗戊午，湖南夏旱，插秧愆期，朝令代播蕎麥。余時守淳昌郡，躬行阡陌，勸相其役，從古水種之地，什七皆蕎麥也。未幾伏秋之交，淫澇復至，而畦塍之間水深沒脛，則蕎麥之病澇，又甚於秔稻之病旱，而南人遂告饑。”: *ibid.* (*Bonliji* 3, 312–313).

⁵¹ “蓋代播誠是也，而所播之種，未得其宜耳。吾東穀種名品雖繁，其實則播耨收穫之期，不甚相遠，其晚蒔而可食者，只有蕎麥與綠豆耳。然二種或喜燥而惡濕，或宜瘠而忌肥，冒昧而作事，宜其勞而無功也。苟能預購中州之異種，如德安之香籽晚、通州之六十日，【俱稻名，七月可蒔。】豈有是也？故廣購嘉種，為救災荒之第一急務也。”: *ibid.*

⁵² Seo Yu-gu, *Uisanggyeonggyecheak ha* 擬上經界策 下, *Nongjeonggyeuguisijoja* 農政之亟宜施措者, *Gugajongbijaesang* 購嘉種以備災傷, *Joseonwangjosillok*, King Heonjong 4 (1838), 6.10.

exceeding the adaptive boundaries encapsulated by the ecological diversity of Joseon rice, which had differentiated and evolved over centuries within the local natural and agricultural environments. To effectively counter these crises, it was critical to proactively introduce Chinese rice cultivars—which had evolved under environmental conditions substantially distinct from those of Joseon, yet remained cultivable in the peninsula under the geographic principles of latitude and temperature—thereby providing a rich repository of technical alternatives tailored to diverse agricultural settings.

Conclusion

From the fifteenth century onward, wet-rice cultivation began to establish itself primarily in the southern regions of the Korean Peninsula. Among its techniques, the transplanting method spread widely after the seventeenth century as an effective solution to labor shortages, despite the persistent risk of crop failure. Wet-rice cultivation is an agricultural practice whose full efficacy can only be realized when techniques finely attuned to the local micro-environmental and ecological conditions are properly executed. Conversely, this implies that a failure to establish technical measures suited to micro-ecologies could expose agricultural practices to potential disaster. Furthermore, due to the climatic characteristics of the Korean Peninsula, where the rainy season generally arrives later than the optimal transplanting period, the threat of crop failure was a constant reality. Under these conditions, the authors of privately compiled agricultural treatises during the Joseon dynasty identified a variety of late-ripening rice cultivars capable of withstanding prolonged drought as a strategy to mitigate such risks.

Seo Yu-gu's *Gongmyeonggo*, particularly its classification of rice cultivars, fundamentally represents an extension of this trajectory. Incorporating the taxonomy of preceding agricultural manuals, he established a primary system for categorizing diverse rice cultivars and documented their distinct morphological and ecological characteristics. His compilation of Joseon's rice varieties integrated not only textual records but also empirical knowledge gathered from experienced veteran farmers, explicitly including the vernacular terminology used in contemporary agricultural practice. Through this approach, he tried to enable rural elites to gain access to the intricacies of wet-rice cultivation—a domain that had previously relied solely on the discerning eye and tacit knowledge of veteran farmers.

Seo Yu-gu in turn actively compiled and introduced not only the rice cultivars of Joseon, but also those of China. Furthermore, he presented a logic supporting the compatibility of cultivating Chinese rice varieties within the Korean Peninsula. This included the projection that double-cropped rice varieties grown in the Jiangnan region of China could likewise be cultivated in Joseon—though this prediction di-

verges from contemporary scientific understanding. In addition, he posited that Chinese cultivars held significant value as viable alternatives for mitigating the increasingly diversified meteorological disasters confronting Joseon at the time.

Framing the *Gongmyeonggo* as a functional *toolbox* prompts a critical reconsideration of the prevailing tendency within Korean academia to interpret late Joseon *myeongmulhak* through the lens of modern natural history. Rather than depicting the discipline as a pursuit of objective knowledge of external objects for its own sake, this study highlights late Joseon *myeongmulhak* as a domain shaped by distinct utilitarian objectives and orientations. Furthermore, the risk-mitigation framework of *myeongmulhak* pursued by Seo Yu-gu serves as an instructive case study illustrating how the investigation of external reality could yield a system of knowledge fundamentally divergent from that established by modern natural history.⁵³

⁵³ Since 2000, a growing body of scholarship has demonstrated that early modern European natural history—and by extension, the Scientific Revolution—originated from the pursuit of knowledge and resource exploration tied to the Iberian powers' administration of their American colonies in the sixteenth century[See Antonio Barrera-Osorio, *Experiencing Nature: The Spanish American Empire and the Early Scientific Revolution* (Austin, TX: University of Texas Press, 2006); Jorge Cañizares-Esguerra, *Nature, Empire, and Nation: Explorations of the History of Science in the Iberian World* (Stanford, California: Stanford University Press, 2006)]. From this perspective, the European natural history tradition can be seen as having developed through the lens of utility rather than purely out of disinterested intellectual curiosity. Nevertheless, this concept of utility displays a clear divergence from the utility pursued by Seo Yu-gu and, more broadly, within the tradition of *myeongmulhak* in Joseon. This distinction merits further investigation in future research.

Abstract

This study examines the classification of rice cultivars presented by Seo Yu-gu in *Gongmyeonggo* 穀名攷 (Treatise on the Names of Grains) to analyze the specific utility he pursued while composing this commentary. This utility manifests in three primary dimensions: first, the adoption of taxonomic categories and the systematic identification of diverse rice varieties aimed at mitigating the potential risks inherent in the transplanting method in wet-rice cultivation and addressing the micro-ecological sensitivity of the method under the climatic conditions of the Korean Peninsula; second, the integration of empirical field knowledge regarding Joseon cultivars, accompanied by vernacular terms to eliminate ambiguity in matching nomenclature with physical objects, thereby converting the tacit knowledge of local veteran farmers into a communicable medium accessible to rural elites; and third, a comprehensive survey of Chinese rice varieties paired with logical arguments supporting the feasibility of their cultivation in Joseon, which was anticipated not only to increase agricultural productivity but also to prepare for unprecedented climate disasters incorporating an analysis of his other treatise, *Ohaego* 五害攷 (Treatise on the Five Disasters). Ultimately, this research contributes to the broader historiography of late Joseon *myeongmulhak* 名物學 (The study of names and things) by demonstrating that the field was driven by the pursuit of practical utility, rather than an inquiry into external objects for its own sake as seen in modern natural history.

Keywords: Seo Yu-gu, Gongmyeonggo, Ohaego, myeongmulhak, disaster, natural history