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A Grain at the Margins: The History of Sirampog Black Rice, the Green Revolution, and Local Food Security in Central Java

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Abstract: Sirampog black rice (*Oryza sativa L.*), a pigmented landrace cultivated for generations on the southern slopes of Mount Slamet in Brebes Regency, Central Java, is now grown by only five or six farmers. This study examines its historical decline and what it reveals about local food security. Using library research, colonial archives from the Delpher digital collection, and field data from 40 purposively selected respondents collected between July and October 2025, the study reconstructs the transition from diverse, ritually embedded rice cultivation to the standardized white-rice system established during the Green Revolution. Archival evidence shows that black rice was known, traded, chemically analyzed, and used in rituals across the Indonesian archipelago since at least the 1840s, although colonial authorities consistently treated it as a marginal crop. Because Sirampog was officially registered as a variety only in 2020, these records represent the history of black rice as a broader type rather than the specific landrace. Field findings identify long growing periods, unstable prices, limited market access, and consumer preference for white rice as the main causes of its decline. Nevertheless, its high anthocyanin content, dietary fiber, drought tolerance, and cultural significance demonstrate its value within a food sovereignty perspective, highlighting landrace conservation as a foundation for resilient and diverse local food systems.

Abstrak: Beras hitam Sirampog (*Oryza sativa L .*), varietas lokal berpigmen yang dibudidayakan secara turun-temurun di lereng selatan Gunung Slamet, Kabupaten Brebes, Jawa Tengah, kini hanya ditanam oleh lima atau enam petani. Penelitian ini mengkaji sejarah penyusutannya serta maknanya bagi ketahanan pangan lokal. Penelitian menggunakan studi pustaka, arsip kolonial dari koleksi digital Delpher, dan data lapangan dari 40 responden yang dipilih secara purposif pada Juli–Oktober 2025. Hasil penelitian merekonstruksi perubahan dari budaya padi yang beragam, berakar pada ritual, dan dikelola komunitas menuju sistem beras putih yang terstandar sejak Revolusi Hijau. Bukti arsip menunjukkan bahwa beras hitam telah dikenal, diperdagangkan, dianalisis secara kimiawi, dan digunakan dalam berbagai ritual di Nusantara sejak sedikitnya dekade 1840-an, tetapi tetap diposisikan sebagai komoditas marginal oleh pemerintah kolonial. Karena Sirampog baru terdaftar sebagai varietas pada 2020, arsip tersebut merepresentasikan sejarah beras hitam sebagai tipe yang lebih luas. Temuan lapangan menunjukkan bahwa masa tanam yang panjang, harga yang tidak stabil, keterbatasan akses pasar, dan preferensi terhadap beras putih menjadi penyebab utama penyusutannya. Meskipun demikian, kandungan antosianin, serat pangan, toleransi terhadap kekeringan, dan nilai budayanya menunjukkan pentingnya pelestarian varietas lokal sebagai fondasi sistem pangan yang beragam, tangguh, dan berkelanjutan.

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INTRODUCTION

Food is never only sustenance. As a field of historical inquiry, food history treats what people grow and eat as a window onto wider transformations, the rise of capitalism, environmental change, social inequality, and the texture of everyday life (Pilcher, 2012). It examines the relationship between humans and food across biological, economic, social, cultural, and philosophical registers, borrowing from anthropology, archaeology, sociology, and geography (Meneses & Carneiro, 1997). In the Indonesian archipelago, no food carries a longer or more politically charged history than rice. Beyond serving as the principal staple, rice has structured agrarian life, social organization, trade, government policy, and belief. Its status as the primary food crop generated successive interventions in production, distribution, price, and commerce, which is to say that rice has long occupied a position far larger than that of an ordinary harvest (Afiff & Timmer, 1971).

Within this history, one thread has been almost entirely lost from view: the fate of pigmented rice landraces. Black rice (dark-grained rice whose color comes from anthocyanins concentrated in the pericarp and aleurone) was once part of the ordinary varietal diversity of Javanese and archipelagic agriculture. Today, it is a rarity. In the highland Sirampog Subdistrict of Brebes Regency, Central Java, a distinctive black rice landrace known locally as *beras hitam Sirampog* or *padi ireng Sirampog* is cultivated by only a handful of remaining farmers, its history poorly documented and largely unknown even within its own province. That obscurity is not incidental. It is the product of a century of agricultural policy that redefined what secure and desirable food should be and progressively narrowed the rice landscape around a small number of high-yielding white varieties.

This article reads Sirampog black rice against two competing conceptions of food security that have shaped modern Indonesia. The first is the productivist conception associated with the Green Revolution, which, from the 1960s, pursued national self-sufficiency through high-yielding varieties, chemical inputs, irrigation, and centralized procurement, and valued rice above all for aggregate yield (Mariyono, 2014; Sutardi et al., 2022). The second is the conception advanced under the banner of food sovereignty. Where mainstream food security concerns the availability, access, and stability of food supply, food sovereignty (articulated internationally from the mid-1990s by movements such as La Via Campesina and taken up in agrarian scholarship) shifts the emphasis to the right of communities to define their own food systems. It foregrounds agrobiodiversity, local and indigenous knowledge, nutritional quality, and community control over seeds and cultivation (Ranteallo et al., 2020). The two conceptions value a crop by different measures: one by tonnage, the other by diversity, nutrition, and cultural rootedness. Sirampog black rice is legible in both registers. Judged by yield and uniformity, it is a poor performer that the productivist model had no reason to keep; judged by anthocyanin content, drought tolerance, and cultural meaning, it is precisely the kind of landrace that a food-sovereignty conception seeks to protect.

The claim advanced here is therefore interpretive rather than strictly causal. The article does not argue that Green Revolution programs directly targeted or eliminated Sirampog black rice; field evidence instead points to long maturity, unstable prices, limited market access, and consumer preference for white rice as the proximate reasons farmers abandoned it. It argues, more modestly, that these proximate pressures are themselves expressions of a rice order built around short-duration, high-yielding white varieties, and that reading a single landrace against this order clarifies what local food security means once diversity, rather than volume alone, is placed at the center. In doing so, the article makes a specific historiographical contribution. Where the historiography of rice in Indonesia has largely worked at the scale of national and colonial policy (Timmer, 1975; Wasino & Hartatik, 2019; Pradadimara, 2015), this study offers a landrace-scale, archive-based history of a pigmented variety, using colonial records of *zwarte rijst* to recover a marginalized strand of Java's rice past and to connect it to present questions of local food security. Functional food, defined by Indonesia's food and drug authority as processed food containing one or more components with scientifically demonstrated physiological benefits that are proven safe (BPOM, 2023), is one contemporary language through which black rice is being revalued; food sovereignty is another. Against this background, this article reconstructs the history of Sirampog black rice, traces its place within the broader history of rice in Java, and analyses its significance for local food security in Central Java.

METHODS

The study was conducted from July to October 2025 in Sirampog Subdistrict, Brebes Regency, Central Java (Figure 1). It combines historical and ethnographic methods across three bodies of evidence.

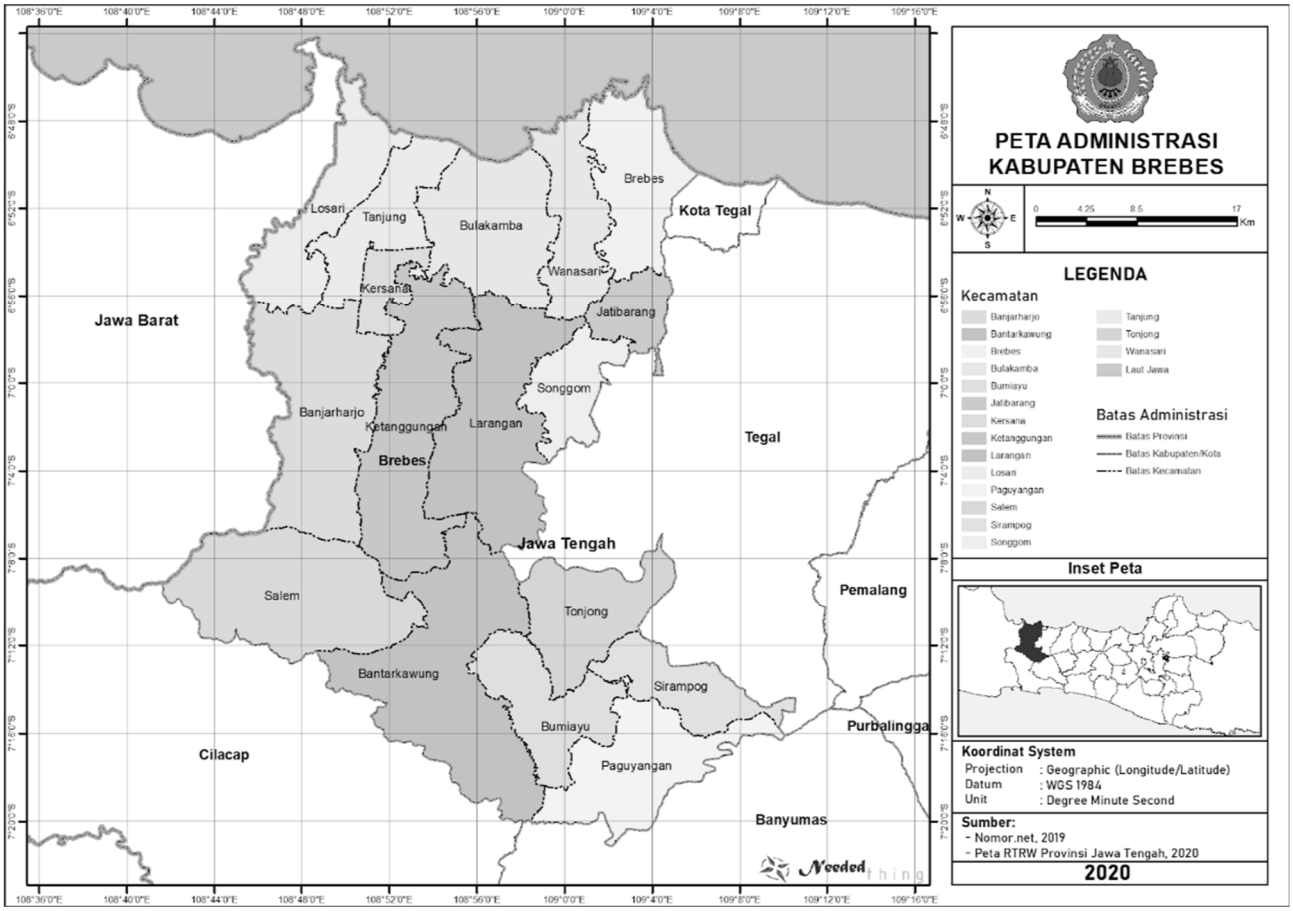


Figure 1. Map of the study site. The location of Sirampog Subdistrict in Brebes Regency, Central Java

First, library research and archival exploration reconstructed the longer history of rice and of black rice in particular. Colonial-era sources were retrieved through the Delpher digital collection of the Koninklijke Bibliotheek, including nineteenth- and early twentieth-century journals, museum guides, books, and newspapers that record the cultivation, trade, chemical analysis, and ritual use of *zwarte rijst* (black rice) across the Netherlands Indies. These primary sources were read heuristically for references to black rice and to rice policy, then cross-checked against the secondary historiography of rice in Indonesia and Southeast Asia.

Second, secondary sources encompassed historical, agronomic, and ethnobotanical scholarship on rice and black rice, providing the interpretive frame within which the local case is situated. Third, field data were obtained from forty respondents selected by purposive sampling. Respondents were chosen for their direct knowledge of the crop and comprised farmers who currently or formerly grew Sirampog black rice; residents and consumers; staff of the Central Java Food Security Service and the Agricultural Service; agricultural extension officers; and traders. Data were gathered through in-depth interviews structured around open-ended questionnaires that covered the history of cultivation, agronomic practices, post-harvest handling, patterns of use and consumption, and perceived health benefits. Interview material was analyzed qualitatively by thematically grouping recurring accounts (for example, consolidating respondents reported perceived health benefits into common categories). At the same time, descriptive counts were used to summarize the frequency of particular practices and uses. Following the historical method, the analysis proceeded through heuristics, source criticism, interpretation, and historiographical synthesis, triangulating archival, scholarly, and field evidence to read the local history of Sirampog black rice in relation to the wider transformation of Java's rice economy.

Two limitations of the source base should be stated at the outset. The colonial archival record documents black rice (*zwarte rijst*) as a general type across the Netherlands Indies; it does not name Sirampog, and no source has been located that refers to the Sirampog landrace specifically before its variety registration in 2020. The deeper history reconstructed here is therefore the history of the type and of the wider rice order into which the landrace was born, not a documentary lineage of Sirampog itself.

The colonial sources also carry the biases of their makers (museum guides, medical officers, traders, and journalists writing within a colonial frame), so their judgments about black rice, including its ranking below white rice, are read as evidence of how the crop was valued rather than as a neutral description.

RESULTS AND DISCUSSION

Rice in the *Longue Duree* of Nusantara

As the staple of archipelagic societies, rice possesses a historical record that reaches deep into prehistory, and long before it became a pillar of modern food security, it had already shaped the cultural landscape of Nusantara. Archaeological research confirms rice (*Oryza sativa*) cultivation in the archipelago dating to at least 3,500 years ago, with the oldest secure evidence from rice phytoliths at the Minanga Sipakko site in Sulawesi (Deng et al., 2020). The sudden appearance of these agricultural traces in the same stratigraphic layer as red-slipped pottery points to a cultural shift driven by population movement from East Asia, spreading southward through Taiwan and the Philippines before reaching Sulawesi. The finding strengthens the association between the spread of rice cultivation and the dispersal of Austronesian-speaking populations along the Taiwan–Philippines–Sulawesi route, consistent with the "Out of Taiwan" and farming-language dispersal hypotheses (Deng et al., 2020).

Entering the historical period, the agrarian culture of Nusantara becomes visible through both material remains and textual sources. Van der Kroef (1952) records that temple reliefs in East Java from the tenth century onward already depict the *pipuhunan*, a small bamboo hut at the corner of a rice field that was the nerve center of the traditional bird-scaring system and, at the same time, a site of ritual devotion to Dewi Sri, the rice goddess. Its presence indicates that agrarian tradition and the spiritual life surrounding rice had been rooted in Javanese culture for more than a thousand years. Geography reinforced this centrality. The fertile volcanic soils and the alluvial corridors of the Brantas and Bengawan Solo valleys allowed wet-rice cultivation to expand on an increasingly large scale, generating agricultural surpluses that underwrote the inland kingdoms of Java, including Majapahit (Ricklefs, 2001).

Rising productivity made Java one of the most important agrarian regions in Southeast Asia. European travelers of the sixteenth and seventeenth centuries consistently linked the island's soil fertility to its abundant rice (Boomgaard, 2007). Early in the sixteenth century, the Portuguese observers Tomé Pires and Duarte Barbosa recorded Java's agrarian plenty, with Pires noting that the island exported high-quality rice in vast quantities and Barbosa describing it as among the most fertile places in the world (Boomgaard, 2007). Centuries later, the geographer H. Blink still portrayed Java as the granary of the Indies Archipelago and the great rice supplier for the eastern and other regions, cultivated through irrigated wet-rice fields whose water management had long been practiced, in places even through formal institutions such as the *subak* of Bali and Lombok (Blink, 1914).

Alongside archaeological and documentary evidence, the long presence of rice culture in Nusantara is preserved in oral tradition. Legends of the origin of rice cast the plant not merely as food but as a symbol of fertility, prosperity, and the continuity of life, and served as vehicles for transmitting agrarian knowledge and cultural values (Van der Kroef, 1952). The best-known of these Javanese legends concerns Batara Guru and Dewi Sri. Van der Kroef (1952) records several variant narratives that place Dewi Sri or another female figure at the origin of rice: in one, rice grows from the body of Retna Dumilah after her death; in another, wet-field rice appears with the disappearance of Dewi Sri. These variants correspond to the coexistence of two cultivation traditions in Java (dryland *padi gogo* and wet-field *padi sawah*), each acquiring legitimacy through myth, and through them rice held a privileged place in the life of agrarian society (Wasino & Hartatik, 2019). The sacredness of rice was enacted across the entire agricultural cycle, from planting to post-harvest, in practices such as honoring the field snake as a manifestation of Dewi Sri and in rituals such as *bersih desa* and *wayang* performances of the *Sri Mulih* story after harvest (Van der Kroef, 1952; Wasino & Hartatik, 2019). Comparable traditions developed across the archipelago with local adaptations, so that the diffusion of rice legends was never uniform but shaped by ecology, livelihood, and cultural dynamics in each region (Van der Kroef, 1952).

This diversity of beliefs was matched by a diversity of local knowledge systems and institutions that sustained rice cultivation in each region's ecology. In Bali and Lombok, communities built subak as irrigation organizations that regulated water distribution and cooperative labor among farmers (Lorenzen & Lorenzen, 2011). The Bugis of South Sulawesi maintained an inherited sequence of cultivation practices from the *tudang sipulung* deliberation, binding tradition, social organization, and the

farming environment together through planting and harvesting (Arno & Jaya, 2023). In Java, cultivation was guided by *pranata mangsa*, a seasonal calendar created during the Mataram Sultanate in the seventeenth century, which indicated the timing of land preparation, planting, and harvesting in accordance with natural cycles (Atmojo, 2021). The existence of these local systems shows that the success of rice cultivation in Nusantara had long depended not on soil fertility alone but on ecological knowledge, community institutions, and communal cooperation. It is against this deep background of varietal, ritual, and institutional diversity that the marginalization of pigmented landraces, and of black rice in particular, should be understood.

Black rice in Archival Record

Black rice belongs to this older, more diverse rice culture. Popularly known in later accounts as "forbidden rice" or "emperor's rice" for its association with imperial China, where its consumption was said to have been reserved for elites, black rice originated and was domesticated in Asia before spreading through trade and cultivation (Kushwaha, 2016). The colonial archive documents this crop far more richly than the present obscurity of black rice would suggest. However, a caveat applies: these sources record *zwarte rijst* as a general type across the Netherlands Indies and nowhere name the Sirampog landrace, which enters the written record only with its 2020 registration. What the archive reconstructs is therefore the history of the type of rice to which Sirampog belongs, and of the rice order that framed it, not a documentary lineage of the Sirampog variety. Within that limit, the record is remarkably consistent: black rice was known, named, traded, chemically analyzed, and used in ritual across the archipelago from at least the mid-nineteenth century, yet was persistently classified as a marginal type.

The commercial presence of black rice is recorded from the 1840s. In a Batavian trade journal, monthly rice prices in Java for 1847 were reported for *padi*, white rice, and black rice together, with black rice (*zwarte rijst*) quoted at between roughly four and six guilders per *pikol* and generally priced below white rice, 5.40 guilders against white rice at 5.80 in January, and 4.60 against 5.40 in May (Buddingh, 1850). A little over a decade later, a Java government gazette recorded black rice among the goods traded at Palembang, where, in March 1859, white and black rice were available at four and two guilders per *pikol*, respectively (Javasche Courant, 1859). Black rice, in other words, was a traded commodity with an established, if consistently lower, market value.

It was also an object of scientific attention. A medical journal of the Netherlands Indies reported in 1864 on a sample of black rice received from Tjie -Leboet near Buitenzorg (Bogor), where it was known by the telling local name *padie berkat*, or "blessing rice," and harvested in August 1863 (*Geneeskundig Tijdschrift voor Nederlandsch-Indië*, 1864). The analysis assigned the black sample a protein content of 6.98 percent and a relative food value of 0.947, below the reference *gaba*; the authors linked this lower nutritional ranking to prevailing local belief and used protein content as the basis of their assessment (*Geneeskundig Tijdschrift voor Nederlandsch-Indië*, 1864). Half a century later, popular science accounts had grasped the physical basis of the colour: a Dutch newspaper explained in 1926 that the silverskin (*zilvervlies*) gives the grain its greyish tint but can also contain red or black pigments, producing what were called red or black rice, and set this observation within the wider problem of colonial rice production and import dependence (*Haagsche Courant*, 1926).

The presence of black rice in Java's varietal wealth was repeatedly recognized. A guide to the Colonial Museum at Haarlem noted in 1900 that the number of rice varieties known to indigenous cultivators far exceeded the number of European potato types, and it singled out black rice as a variety remarkable more for its color than for its quality (Koloniaal Museum, 1900). The same judgment had appeared a quarter-century earlier in a museum overview that likewise placed black rice among the ordinary types (glutinous, common, red, and black), each distinguished by use rather than prestige (Nederlandsch Maatschappij ter Bevordering van Nijverheid, 1875). A weekly feature on rice cultivation in Java in 1914 confirmed that more than a hundred kinds of rice were recognized. That color, including black, was one axis of varietal classification within Javanese agricultural knowledge, even where the local variety names were not recorded (Kooy-van Zeggelen, 1914).

Two further features of the archival record anticipate the situation later observed at Sirampog. First, black rice was planted as a boundary and protector plant in the field. A Dutch provincial newspaper described how, in 1928, to separate plots, a row of black rice with black grains was planted along the boundary (*Utrechtsch Provinciaal en Stedelijk Dagblad*, 1928). This use of a visually distinctive rice variety as a living field marker resonates directly with Sirampog farmers' recollection

that black rice was originally planted along the edges of their fields. Second, black rice held a specific ritual role. In H. F. Tillema's account of the Netherlands Indies, black rice appears among the four color-classified rices of the Karo Batak, namely white (*beras bentar*), black (*beras biring*), red (*beras megara*), and yellow (*beras megersing*), which an officiant sprinkled over the heads of participants in ritual; among the Toraja, glutinous rice and wholly black rice were reported to be cultivated principally to serve in offerings to spirits and ancestors (Tillema, 1921). The colonial record thus shows black rice woven into the ceremonial and ecological fabric of archipelagic agriculture, even as it was ranked below white rice in market and nutritional terms. This double character, culturally meaningful yet commercially marginal, defined the position from which black rice would enter the era of colonial and, later, national rice policy

Rice under Colonial and Occupation Regimes

For centuries, rice has not only shaped the economic life of Nusantara but also a system of values, beliefs, and cultural identity transmitted across generations. Under Dutch colonial rule, the governance of rice began to shift. Where management had previously centered on meeting local needs and sustaining local agrarian practice, the colonial state placed rice within a framework of administration, economic interest, and production policy (Timmer, 1975; Wasino & Hartatik, 2019). In the early stages of the formation of the Netherlands Indies, official attention to rice production remained relatively limited, and agricultural policy was directed instead toward commercial crops, above all sugar (cf. Wasino et al., 2026, on the Mangkunegaran sugar industry), so that peasant wet-rice land was frequently drawn into rotation between rice and cane (Wasino & Hartatik, 2019).

Concern with rice as a strategic good nonetheless surfaced early. As far back as 1655, Sunan Amangkurat I banned rice exports from Java in response to a drought that had driven prices up by roughly 300% (Timmer, 1975). During the colonial period, the Dutch initially adopted a relatively liberal stance, removing rice import duties after the failed harvest of 1863, requiring government needs to be met from domestic production in the 1880s, and again banning exports when a poor harvest raised prices in 1911. These measures indicate that rice is being treated as a strategic commodity that requires intervention to stabilize supply and prices. Yet through most of the nineteenth century, colonial policy continued to favor the export economy. The *Cultuurstelsel* of 1830–1870 and the Liberal Policy that followed promoted export crops, such that peasant rice fields had to share ground with commercial commodities through crop rotation (Wasino & Hartatik, 2017, 2019; Ricklefs, 2001). In the wider regional division of labor of colonial Southeast Asia, Burma, Siam, and Cochinchina developed as rice-exporting centers. At the same time, the Netherlands Indies was oriented toward plantation commodities such as sugar, coffee, and rubber, so that domestic rice needs still had to be supplemented by imports (Pradadimara, 2015).

A more fundamental change came in the 1930s. The global depression and a glut of rice in Asia pushed the Netherlands Indies government to abandon its comparatively liberal market approach. In 1933, free rice imports were ended and replaced by a licensing system, followed by price controls, regulation of the distribution of Javanese rice beyond Java, the establishment of the *Stichting het Voedingsmiddelenfonds* (VMF) in 1939, and regulation of the rice-milling industry in 1940 (Timmer, 1975). These interventions built the institutional and regulatory foundations of the rice trade for the period that followed, and they crystallized a new paradigm that Timmer (1975) captured in the judgment that rice had become too important to be left alone. Rice was now regarded as too strategic to be surrendered entirely to the market, so that state intervention in production, distribution, and price became the principal instrument for maintaining a stable supply. This paradigm would underwrite Indonesian food-security policy after independence. Contemporary documents register the machinery of this control: a proposed rice syndicate to promote and standardize Indies rice for export (*Bataviaasch Nieuwsblad*, 1933), the placement of Javanese rice exports under state supervision in 1941 with supply prioritized to British Malaya (*De Tijd*, 1941), and the acceleration of irrigation works to raise rice output (*De Sumatra Post*, 1940). At the village level, the colonial administration also worked to reshape indigenous granary institutions: the *lumbung desa*, or village rice barn, was a credit institution and a means of poverty management for villagers, storing rice against scarcity and the lean season (Rinardi et al., 2017; Hartatik et al., 2023, on the transformation of the village barn into a village unit cooperative in Demak-Grobogan). Local food security during this period rested as much on community stores as on colonial regulation, and the erosion of these institutions would later leave rural populations more exposed to the market fluctua-

tions documented during the drought-stressed 1930s (Van der Eng, 2010).

The tightening of control reached its most destructive extreme under the Japanese occupation of 1942–1945. The occupation government seized control of rice milling and imposed forced deliveries, mobilizing *romusha* labor and diverting harvests to military supply, while the rice procurement system broke down and flooding worsened after 1944; the resulting scarcity produced famine in Java, most severe in 1944 (Rosdiana & Khairina, 2026). This collapse marks the endpoint of the colonial-occupation sequence and the immediate inheritance of the independent republic: a rice economy that had been thoroughly reorganized as an object of state management, and a population for whom the security of rice supply had become a matter of survival (cf. Hartatik et al., 2021, on the wider disorder of the revolutionary years in coastal Java). Neither the colonial market order nor the wartime command economy left room for the diversity of pigmented and dryland landraces that had characterized the older rice culture; both pushed cultivation toward standardization around the white rice that commanded the highest price and the closest official attention.

The Green Revolution and the Narrowing of the Rice Landscape

Rice occupied the center of national life after independence with even greater force. Where earlier attention had focused on the stability of supply, the problem of rice after 1945 became inseparable from the project of building national food security, reflecting the weight of rice in the economy: across the twentieth century, rice production accounted for roughly half of the value added in the agricultural sector, so that its availability and affordability bore directly on popular welfare (Marks, 2010). The early years of independence, however, were far from stable. Infrastructure damaged by the occupation and the war of independence, together with weak food-management institutions, caused the distribution system built at the end of the colonial period to deteriorate; price fluctuations rose sharply, and regional price disparities widened as the national rice market lost its integration (Marks, 2010). Food security, this experience showed, depended not only on raising production but on the effectiveness of distribution and market integration in securing access to rice.

The two decades between independence and the Green Revolution were a period of improvisation rather than transformation. Successive governments inherited the colonial conviction that rice was too strategic to leave to the market, and they retained instruments of procurement and price management, but political instability, limited fiscal capacity, and recurrent shortfalls kept policy reactive (Afiff & Timmer, 1971). Production could not keep pace with a growing population, and the young republic remained dependent on rice imports; rice supply was as much a matter of political order as of agronomy, and the search for a durable solution to the "rice problem" ran through the whole Old Order period (Afiff & Timmer, 1971; Marks, 2010). The varietal question in these years was still framed around improving the local varieties farmers already grew rather than replacing them wholesale, so the diversity inherited from the older rice culture, including black rice, persisted at the margins even as white rice remained the object of policy.

For nearly three decades, production could not keep pace with population growth, and Indonesia continued to rely on rice imports into the early 1970s. The turning point came in the mid-1970s, when rising state revenue from the oil boom created fiscal space for large investment in agriculture (Pradadimara, 2015). Through irrigation, the dissemination of high-yielding varieties, subsidized inputs, and agricultural extension, the government drove up the productivity of rice cultivation. At the same time, the establishment of the National Logistics Agency (Bulog) in 1974 strengthened procurement and price stabilization by defending a floor price through purchases at the village-cooperative level (Mariyono, 2014). This was the Indonesian form of the Green Revolution. It underwent a succession of intensification programs (BIMAS in the 1960s, then INMAS, INSUS, SUPRA INSUS, and later formulations) centered on the mass adoption of new high-yielding varieties, supported by irrigation and fertilizer (Sutardi et al., 2022). The combination delivered national rice self-sufficiency in 1984, with average yields rising from about 2.8 to 4.2 tonnes per hectare, most of the gain attributable to intensive productivity increases rather than to the expansion of rice land (Mariyono, 2014). By the mid-1970s, the country had entered the Green Revolution proper, and the New Superior Varieties accounted for the majority of the resulting productivity growth (Panuju et al., 2013).

The productivist model carried costs that fell directly on landrace diversity. Until the 1970s, varietal development had still worked largely by improving local varieties, chiefly to shorten their life cycle for multiple harvests; from the 1970s, high-

yielding introductions such as PB5 and PB8 took the dominant role, yielding four and a half to five and a half tonnes per hectare but requiring heavy fertilisation and proving more susceptible to pests, which in turn drove rising pesticide subsidies (Sutardi et al., 2022; Mariyono, 2014). The measure of success was volume, and volume was delivered by uniformity. Slow-maturing, tall, low-yielding pigmented landraces such as Sirampog black rice had no place in a system organized around short-duration, semi-dwarf, high-response white varieties. The consequence was a narrowing of the rice landscape and an erosion of the varietal, ritual, and institutional diversity described earlier.

The mechanism of that narrowing is visible in comparable landrace regions. In the Toraja highlands, the number of local rice varieties declined after the regional government funded communities to substitute new high-yielding varieties for their landraces, and the rice rites bound up with those landraces moved to the brink of extinction; conservation now depends on the collective memory and foodways that sustain the meaning of local rice across generations (Ranteallo et al., 2020). Toraja shows a direct, policy-driven substitution; Sirampog presents a subtler case, in which the same productivist order operated less through a program aimed at black rice than through the market and preference structures it created. It is to that local case, and to the proximate reasons farmers give for abandoning the crop, that the analysis now turns.

Sirampog Black Rice: a Landrace at the Margins

Sirampog black rice (*Oryza sativa* L.) is a traditional landrace cultivated for generations in the highland ecosystems on the southern slopes of Mount Slamet, in the Sirampog Subdistrict of Brebes Regency, and maintained through small-scale subsistence farming (Figure 3). Central Java has been reported to hold six black rice varieties, found in Magelang, Surakarta, Wonosobo, Sragen, Banjarnegara, and Brebes, with Indonesian black rice varieties grouped by morphological and genetic variability in earlier work (Sa'adah et al., 2013; Kristamtini et al., 2012). Among these, the Sirampog landrace is distinguished by its dark purple color and its fragrant aroma when cooked. In 2020, it was formally registered as a local variety with the Center for Plant Variety Protection and Agricultural Licensing of the Ministry of Agriculture. It received a plant variety registration certificate on 6 May 2020 (Figure 2). In the same years when only a handful of farmers still grew it, a landrace once relegated to the field margins was being enrolled in the formal apparatus of variety protection.

Read as evidence rather than as an agronomic catalog, the crop's measured characteristics reveal why it was disadvantaged under the productivist model and why it is valued now. In the traits the productivist model rewards, Sirampog black rice performs poorly. It produces relatively few tillers, stands tall at 130 to 175 cm (well above the 110–130 cm height most farmers prefer and above black rice from Klaten and Toraja), and matures slowly, at around 180 days after planting, far longer than the black rice of Karanganyar, Klaten, or Toraja at 117 to 126 days (Prayoga et al., 2018; Nandariyah et al., 2016). Tall stature and a long cycle are precisely the properties that intensification sought to breed out in favor of short-duration, lodging-resistant, high-response types. On other traits, the landrace performs strongly: it has strong stems and a lodging rate below five percent despite its height, a yield of four to five tonnes per hectare that exceeds that of the black rice in the three comparison regions, and heavier grains (Nandariyah et al., 2016). These strengths were never sufficient to offset the penalties of height and duration within a system that prized rapid, uniform turnover.

The traits that now make the crop valuable lie elsewhere: in its chemistry and its cultural embeddedness. Anthocyanins, which give the grain its color, are strong antioxidants (Pratiwi & Purwestri, 2017). According to Sirampog farmers, laboratory tests of the local variety were carried out together with the local Agricultural Extension Center (Balai Penyuluhan Pertanian), and the reported results, printed on the packaging of Sirampog black rice products distributed to other regions, record a high anthocyanin content, on the order of several thousand milligrams per kilogram, which the community treats as the basis of the crop's health claims. These locally reported figures should be read as claims made for the product rather than as independently verified measurements. However, they are consistent with the wider comparative record: laboratory analysis of Central Javanese black rice places it among the more anthocyanin-rich pigmented rices, well above white rice and above several other regional black rice varieties (Nandariyah et al., 2018). Its crude fiber content is also higher than that of white rice, contributing to digestive health and satiety (Chanu, 2015). These properties place black rice within the category of functional food and, more broadly, within a genetic and phytochemical diversity that the productivist model overlooked. Analysis of Indonesian black rice culti-

vars shows that local landraces exhibit higher levels of phenolics, flavonoids, anthocyanins, and antioxidant capacity than improved varieties, with a landrace such as Hitam Banjarnegara ranking highest in phytochemical properties and an improved variety such as Inpari 23 ranking lowest (Fitri et al., 2021). The very landraces that were displaced for their low yield now hold nutritional qualities that are increasingly sought after. Local black rice also carries agronomic value under climate stress: Central Javanese black and red rice landraces have been assessed as candidates for drought-tolerant cultivars, a trait of growing importance as production becomes more exposed to climatic variability (Awanis et al., 2022).

Field evidence from Sirampog shows how this value is understood and practiced locally. Residents generally cook black rice mixed with white rice, using roughly two to four tablespoons of black rice per kilogram of white rice, and also prepare it as a beverage by steeping one to two tablespoons of raw grain in hot water, sometimes combined with ginger or milk (Figure 5). The community recognizes that the pigment is concentrated in the bran layer and takes care during post-harvest processing to keep the pericarp and aleurone intact, thereby preserving the nutritional content. Drawing on generations of use, residents identify a set of perceived health benefits from regular consumption (lowering blood sugar and cholesterol, supporting cardiovascular and liver function, and improving stamina) that align in substance with the documented roles of anthocyanins and fiber in human metabolism (Pratiwi & Purwestri, 2017), health provision in Java had itself long been shaped by colonial policy (cf. Hartatik et al., 2025). This local pharmacopeia is not unique to Sirampog. Ethnobotanical study of black rice in Central Aceh found it used chiefly as medicine, but also as food, as a plant protector, in traditional games, as a cosmetic, and as animal feed, a breadth of use that testifies to the depth of indigenous knowledge attached to the crop (Hamim et al., 2022). Comparable local knowledge is documented for black rice in West Java (Dewi et al., 2018) and reviewed more generally across Indonesian cultivars (Pratiwi & Purwestri, 2017).

The crop's precarious present makes the stakes plain, and the reasons farmers give for abandoning it are concrete rather than programmatic. Only about five or six farmers in Sirampog continue to cultivate and preserve the traditional knowledge of this black rice, maintaining it as a family legacy (cf. Wasino et al., 2021, on the place of ordinary villagers, or wong cilik, in Javanese culture) ; according to those farmers, black rice was originally planted along the edges of the fields to help repel the birds that attacked the main crop, an echo of the colonial -era practice of using black rice as a field boundary marker (*Utrechtsch Provinciaal en Stedelijk Dagblad*, 1928). Extension records indicate that before the COVID-19 pandemic, some twenty to twenty-five farmers grew the variety, but limited market access and unstable prices pushed many to abandon it. Its long six-to-seven-month cycle compares unfavorably with the four-to-five months of modern high-yielding varieties. Farmers prefer faster and more reliable crops, and most consumers favor cheaper, more widely available white rice. None of these proximate pressures is a Green Revolution program aimed at black rice; each, however, is a feature of the rice order the Green Revolution built, an order organized around short-duration, high-yielding white varieties, dependable markets for them, and a consumer taste shaped by their ubiquity. The decline of Sirampog black rice is thus best read not as the intended outcome of a policy but as a predictable effect of that order on a crop it did not value. The landrace nonetheless retains adaptive value: it has been reported to grow in a district of neighboring Cilacap Regency, indicating the capacity to establish in other areas. Marginalized by the criteria that governed the productivist model, it carries precisely the nutritional, cultural, and adaptive qualities that a food-sovereignty conception of security now seeks to protect.

Food Sovereignty and Local Food Security

Entering the twenty-first century, the challenge of rice food security shifted again. The problem is no longer solely one of raising production but of maintaining the balance between production and consumption amid population growth, land conversion, climate change, and volatile food markets (Sutardi et al., 2022; cf. Hartatik et al., 2022, on road development and land use change in Semarang). National production recorded surpluses of roughly 1.9-2.9 million tonnes per year over 2008–2017. Yet, consumption growth steadily narrowed that margin, prompting continued innovation in varieties, mechanization, integrated crop management, and digital cropping calendars (Sutardi et al., 2022). Read across its long history, rice shows that food security is a process that keeps changing with the environment, technology, and social needs. The concept of food security itself evolved over this period, shifting from an emphasis on aggregate availability to questions of access, stability, and self-reliance, and was formalized in national policy, such as Law No. 7 of 1996, even as rice self-

sufficiency remained the central political benchmark (Suryana, 2008). The paradigm of self-sufficiency, measured in aggregate tonnage (the direct descendant of the colonial judgment that rice was too important to be left alone and of the intensification drive that delivered 1984), captures only part of what security requires. It says nothing about diversity, nutritional quality, ecological resilience, or the cultural and institutional knowledge on which local food systems depend.

This is where the history of Sirampog black rice becomes instructive for policy, and where the distinction between food security and food sovereignty does analytical work. The mainstream food-security paradigm, formalized in Indonesian policy and anchored to self-sufficiency, asks whether enough rice is available and accessible; it is largely indifferent to which rice, grown by whom, under whose control. A food-sovereignty perspective asks the further questions the security paradigm brackets: whose knowledge governs the crop, whether the diversity of the seed stock is maintained, and whether communities retain the capacity to grow and value food on their own terms (Ranteallo et al., 2020). Read through the first lens, a landrace grown by five farmers is negligible; read through the second, it is an asset. Sirampog black rice contributes to local food security along several axes that aggregate production figures miss. Nutritionally, its anthocyanin and fiber content offer a functional-food alternative rooted in a locally grown crop rather than an imported supplement (Pratiwi & Purwestri, 2017; Fitri et al., 2021). Ecologically, its performance under drought stress and its capacity to establish beyond Sirampog make it a reservoir of adaptive traits for conditions of increasing climatic variability (Awanis et al., 2022). Culturally, it carries a body of indigenous knowledge (about cultivation, post-harvest handling, preparation, and therapeutic use) that constitutes a form of food-system resilience in its own right (Hamim et al., 2022). Each of these is a dimension of security that a metric of aggregate tonnage cannot register.

The Toraja case shows both the fragility and the durability of such assets, and points to collective memory as the mechanism through which landraces survive. There, conservation persists less through formal seed banks than through collective memory and foodways, the daily practices, meanings, and symbols by which a community keeps its local rice alive even as external funding pushes toward high-yielding substitutes (Ranteallo et al., 2020). Sirampog presents the same pattern in miniature: the persistence of black rice depends on a handful of farmers who maintain it as heritage and on a community that remembers its uses and benefits. Formal recognition through variety registration in 2020 and rising market interest in functional foods add institutional and economic dimensions that Toraja's rites lacked, but the underlying condition remains the same. A landrace survives where memory, practice, and meaning endure, and it can be lost within a single generation when the last practitioners stop practicing.

Reframing conservation in these terms suggests concrete, if modest, measures. The 2020 variety registration already provides a legal identity that can protect the landrace and its community of origin; building on it, community-based seed systems that keep viable stock in farmers' hands, extension support tailored to a long-duration heritage crop rather than to high-yielding varieties, and niche markets that reward the crop's functional-food and heritage value could make continued cultivation economically viable for more than a handful of growers. None of this requires displacing the productivity gains that underwrite national supply; it requires recognizing that local food security also depends on the diversity on which those gains were built. The century that delivered national rice self-sufficiency did so by narrowing the rice landscape; securing local food systems for the century ahead will depend, in part, on widening it again.

CONCLUSION

The history of Sirampog black rice, reconstructed from archival, scholarly, and field evidence, shows a landrace read against two competing conceptions of food security. In the older rice culture of Nusantara, black rice was one strand of a diverse agriculture, saturated with ritual and governed locally, documented across the colonial archive as a rice that was known, traded, analyzed, and used in ceremony from at least the 1840s, even as it was ranked below white rice for its color rather than its quality. The colonial and occupation regimes reorganized rice as an object of state management and pushed the rice landscape toward standardization; after independence, the Green Revolution consolidated a rice order built around high-yielding white varieties, dependable markets, and the consumer preferences they shaped. Sirampog black rice (slow-maturing, low-yielding, and now grown by only five or six farmers) had no place in that order, and the proximate reasons for its decline that farmers report, from long maturity to unstable prices to consumer preference for white rice, are that order's local effects.

The same crop, however, carries the qualities that a food-sovereignty conception of security prizes: high anthocyanin and fiber content, adaptive value under drought, and a living body of indigenous knowledge and cultural meaning. Field evidence confirms that the wisdom of cultivating black rice has been passed down through generations and that the community. However, its detailed knowledge is now limited, holds firmly to the belief that regular consumption maintains health and prevents degenerative disease. Read against the long history of rice in Java, the near-disappearance of Sirampog black rice is best understood not as the natural end of an inferior crop but as the local signature of a food-security paradigm that measured security by volume alone. Its future (and, with it, a more diverse foundation for local food security in Central Java) depends on conserving the landrace together with the farmers, knowledge, and meanings that sustain it.

Two limitations frame these conclusions. The colonial archive documents black rice as a general type and does not name the Sirampog landrace, so the deeper history offered here is that of the type and its rice order rather than a documentary lineage of Sirampog itself; establishing that lineage would require local records, oral histories, and material evidence beyond the present source base. The locally reported laboratory figures for the crop's nutritional content are product claims rather than independently verified measurements, and systematic phytochemical and genetic characterization of the Sirampog landrace, alongside comparison with other Central Javanese black rice, remains a task for future research. Within these limits, the article's contribution is to bring a single pigmented landrace into the historiography of Indonesian rice, and to show that the history of what was marginalized is as instructive for local food security as the history of what was made to succeed.

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