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"One Year's Seeding, Five Years' Weeding": The Vegetal Body of Lalang (*Imperata cylindrica*) and Weed Management in Rubber Plantations

ABSTRACT

In the first decade of the twentieth century, British Malaya was a centre of commercial and scientific attention as a potential site for large-scale rubber cultivation. What obstructed the colonial ambitions of commercial rubber plantation was the presence of lalang, *Imperata cylindrica*, a plant native to Southeast Asia, deemed an extremely invasive weed to rubber by the European planters and the subject of many weed management campaigns. The establishment of scientific institutions to study the tropical biota coincided with the violent extraction of human and more-than-human bodies. By examining the portrayals and treatments of lalang in colonial archives and historical newspapers, this paper engages with the plant turn that treats plants as agents capable of reshaping the living material world. On the one hand, this paper attempts to uncover how the colonial projects of rubber cultivation constructed ideas of lalang as an invasive weed, symbolic of the overall inferiority of the region, justifying the exploitation of bodies and land for the purpose of commercial interests. Yet these attempts to enforce colonial domination were also challenged by the unpredictable growth of lalang and vegetal bodies as they defied constructed ideas of pest and profitability and thus played a significant role in the empire-making processes in British Malaya.

BY

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Introduction

The increased exchange of scientific information between Western scholars and scientists in the nineteenth century not only led to the emergence of scientific institutions in colonial metropoles but also enabled the transfer of capital and manpower internationally. Such was the case for the colonial networks connecting the commercial harvest of rubber in Brazil and the colonial offices in Southeast Asia. The success of Brazil's commercial rubber industry spurred scientific interest in the development of rubber cultivation and other monocrop-based industries in the tropical colonies of Southeast Asia.[1] With the establishment of the Singapore Botanic Garden in 1859, British Malaya in the first decade of the twentieth century emerged as one of the potential arenas to experiment with large-scale rubber cultivation, which simultaneously saw the arrival of European planters and ecologists to map and evaluate the aptness of unfamiliar tropical biota for rubber plantation.[2] One species that frustrated many rubber planters was *Imperata cylindrica*, referred to as "lalang" in Malay. Known for its damage to rubber plant roots and resistance to fire and common pesticides, the failures of planters and scientists to achieve lalang eradication at a time of increased industrial demand for rubber reflect the continuities and ruptures in the colonial projects of productivising nature.[3] This decade of experimentation at the beginning of the 1900s, before the institutionalisation of rubber research and the science of weed control in the Rubber Research Institute of Malaya in 1926, provides insights into the successes and failures of the colonial administration in economic botany, weed management, and land transformation.[4] This investigation explores how weed management enabled colonial control over particular plants and people as exploitable resources, as well as the power of natural disturbances and more-than-human actors in gaining a foothold in deterring commercial agriculture. The research will begin firstly by deconstructing the colonial portrayal and treatment of the local plant lalang as a dangerous weed. More importantly, I aim to identify how this creation of persistent, ineliminable weed features confirms a colonial-racial hierarchy that portrays the local Chinese and Malay population as lazy and lacking discipline, thus only fit to be exploited as a labour force. Moving onto planters' solutions for lalang eradication, the article will draw attention to the characterisation

1 Lucile H. Brockway, "Science and Colonial Expansion: The Role of the British Royal Botanic Gardens," *American Ethnologist* 6, no. 3 (1979): 450.

2 Jeyamalar Kathirithamby-Wells, "Peninsular Malaysia in the Context of Natural History and Colonial Science," *New Zealand Journal of Asian Studies* 11, no. 1 (2009): 337, EBSCOhost.

3 Edward Greatrex, "'Back to the Jungle': Investigating Rats, Grass, Scrub Typhus, and Plantations in Malaya, 1924–1974," *Medical Anthropology* 42, no. 4 (2023): 342, https://doi.org/10.1080/01459740.2023.2185887.

4 Kathirithamby-Wells, "Peninsular Malaysia," 372.

of weeds both as an obstacle to modernisation and a protective agent in the face of unexpected ecological challenges such as fungal attacks. Finally, focusing on the ways planters and biologists studied and experimented on the behaviour of lalang, this paper aims to uncover how the unpredictable growth of lalang and the natural biota of British Malaya informed agendas of plantation estates and research institutes as well as reshaped colonial pest control management, highlighting the diverse roles of more-than-human actors in empire-making processes.

Primary Sources

This article will primarily draw on the scientific publications of colonial planters and botanists as primary sources. Most experiments and discussions on lalang come from the journal *Agricultural Bulletin of the Straits and Federated Malay States* (hereafter the *Agricultural Bulletin)*, which was initially called the *Agricultural Bulletin of the Malay Peninsula* and founded by H. N. Ridley in 1891. This periodical marked the emergence of a European scientific community devoted to economic botany and the growth of commercial cultivation of rubber as plantation crop in tropical colonies.[5] Appointed by Governor Sir Cecil Clementi Smith as the Director of the Forests and Gardens of the Straits Settlements, Ridley's former experience as gardener and botanist put him "on a par" with the Directors of the Botanic Gardens in Ceylon and Jamaica.[6] The monthly issues of the *Agricultural Bulletin* published research from the scientific community constituted by European botanists and ecologists.[7] Collectively, these experts set the stage for the development of economic botany, a field that received extensive government support for its application of science to agriculture and the methodological improvement to plant cultivation and breeding.[8] By tracing how trends in weed management for rubber cultivation changed from around 1900 to 1910, this investigation contributes to understanding the evolution of pest management from individual, amateur observations from travellers' expeditions to systems of standardised procedures on pest control and plantation management.[9]

Alongside the aforementioned scientific publications, I consider colonial newspapers that published English-language updates on visits of imperial

5 K. M. Wong, "A Hundred Years of the Gardens' Bulletin, Singapore," *Gardens' Bulletin Singapore* 64, no. 1 (2012): 2.

6 Wong, "A Hundred Years of the Gardens' Bulletin," 357.

7 Mohd Hazim Shah, "Historicising Rationality: The Transmission of Rationality and Science to the Malay States Under British Rule," *Asian Journal of Social Science* 35, no. 2 (2007): 235, https://doi.org/10.1163/156853107X203441.

8 Shah, "Historicising Rationality," 235.

9 Kathirithamby-Wells, "Peninsular Malaysia," 357.

officials and investors to British Malaya such as *The Straits Times*, *Straits Budget*, and *Straits Echo*. By comparing the changing trends in the fields of botany and rubber cultivation through both academic sources from scientists and remarks by European investors, I was able to examine how the "scientific" studies of plants and environment interacted and intertwined with industrial interests that treated plant, land, and humans as strategic resources. Dating back to 1845, *The Straits Times*, an English-language daily newspaper published for overseas distribution, and the *Straits Budget*, the weekly issue of *The Straits Times*, circulated updates on commercial and industrial development in the Malay states and Straits Settlement.[10] *Straits Echo*, on the other hand, was a daily chronicle published by the Criterion Press from 1903 to 1931 in Penang.[11]

Additional publications by planters and colonial officers are also included to situate the concerns about lalang in the overall colonial passion towards maximising productivity and claiming authority over nature. *The Rubber Tree Book,* written by the Scottish commissioner W. F. de Bois Maclaren, offers an overview of rubber management with the purpose of "offering better results... and to achieve these on more economical lines."[12] Published for the purpose of improving the efficiency of rubber companies, *The Cultivation of Hevea: A Manual for the Planter* documents the journey of the Dutch merchant P. J. S. Cramer from Singapore to Penang and the various improvements in rubber cultivation he wished to communicate to the planters.[13] In contrast, the account *My Tour in Eastern Rubber Lands* written by Sir Herbert Wright came from one of the most prominent voices of rubber research.[14] As the director of the Agricultural Experiment Station in Ceylon and later editor of the *India Rubber Journal*, Wright's observations on rubber and lalang growth allow us to study the dominant trends in weed management and economic botany at the time of their emergence.[15]

Overall, engaging with scientific journals, newspapers, and accounts from planters across the European empires allows the researcher to consider the management system of rubber production in British Malaya as a hybridity of knowledge exchanges from interimperial collaboration and European interpretations of the local biota. This text also acknowledges that a focus

10 Stephanie Ho, "The Straits Times," National Library and Archives Board of Singapore, https://www.nlb.gov.sg/main/article-detail?cmsuuid=382e8b41-dc5a-4091-af00-56ae985f0c5c.

11 Straits Echo, NewspaperSG, https://eresources.nlb.gov.sg/newspapers/browse/strait-secho.

12 W. F. de Bois Maclaren, *The Rubber Tree Book* (Maclaren & Sons, 1913), 20.

13 Pieter J. S. Cramer, *The Cultivation of Hevea: A Manual for the Planter*, trans. Stuart R. Cope and A. Content (Amsterdam, 1911), 19.

14 Herbert Wright, *My Tour in Eastern Rubber Lands* (Maclaren & Sons, 1908).

15 "Sir Herbert Wright," *Nature* 146, no. 3708 (1940): 677, https://doi.org/10.1038/146677a0.

on sources produced by colonial administrations and European scholars risks reproducing a Eurocentric perspective that ignores crop cultivation methods developed and practiced locally in the Malay Peninsula. However, this approach also reflects the uneven representation in archival record, where documentation of indigenous rubber cultivation practices remains fragmentary and limited by the "complex machinations of the British administrators and the Malay aristocracy."[16]

Literature Review

This research is primarily motivated by the "plant turn" that sees scholars like Sophie Chao reconsidering the social role of plants, specifically, as "communicative, sentient, and worldmaking actors" capable of influencing the human and more-than-human.[17] Among these scholars, I was inspired by Jeyamalar Kathirithamby-Wells's evaluation of the role of natural history in expanding the boundaries of colonial enterprise through the cataloguing and "territorialization" of nature.[18] Consequently, this project will centre on how scientific mapping of unknown territories and biota through observation and plantation experiments served to advance empire-making. Within this concern with the role of science in colonial projects, this work specifically examines the intersection of scientific knowledge production and rubber cultivation. Existing literature on rubber plantations in British Malaya centres on plantation logics of landscape transformation and racial and colonial control that governed plant and people across time and space in relation to changing market demands.[19] In consideration of the focus on rubber cultivation, this paper also responds to the concept of vegetal geography in the Plantationocene discourse as articulated by Maan Barua, who uses the uncontrolled proliferation of the plant Mikania in Assam to emphasise the significance of plants as agents that have bearings on the social organisation of colonial plantations as well as a part of its lasting damage "brought upon to the vulnerable Adivasi community."[20] Adding to the discussion on the role of plants, Jennifer Atchison and Lesley Head foreground how "bodies" are an

16 James C. Jackson, "Chinese Agricultural Pioneering in Singapore and Johore 1800-1917," *Journal of the Malaysian Branch of the Royal Asiatic Society* 38, no. 1 (1965): 77, https://www.jstor.org/stable/41491840.

17 Sophie Chao, *In the Shadow of the Palms: More-Than-Human Becomings in West Papua*, (Duke University Press, 2022): 8, https://doi.org/10.1215/9781478022855.

18 Kathirithamby-Wells, "Peninsular Malaysia," 346.

19 Mardi Reardon-Smith, "In the Weeds: Thinking Through Anthropological and Other Social Science Approaches to Invasive Plant Species and Their Control," *Environment and Planning E: Nature and Space* 8, no. 2 (2025): 3, https://doi.org/10.1177/25148486241311796; Maan Barua, *Plantation Worlds* (Duke University Press, 2024): 3.

20 Maan Barua, "Plantationocene: A Vegetal Geography," *Annals of the American Association of Geographers* 113, no. 1 (2023): 24, https://doi.org/10.1080/24694452.2022.2094326.

unacknowledged scale and space in plant management. Similarly, Atchison and Head propose the idea "vegetal bodies" as "a corporeal refiguring" that foregrounds the bodily transformation and identities of plants in different material forms, which in turn "provides new insights into the kinds of things that plant life does, and how plants come together with other non-plant (including human and animal) bodies."[21] Considering the perspective of vegetal agency, this article also engages with the field of weed management, which scholars such as Peter Triantafillou regard as a modern field of political intervention and contestation.[22] Evaluating the bodies of knowledge and techniques of governance involved in pest control gives insights into the heterogeneous meanings given to plant ecologies for profit maximisation and resource conservation, which in turn highlight plants as agents capable of rectifying the systems built to extract value from them.

While widely recognised as one of the most problematic weeds for colonial plantation management, very little attention has been paid to the social role of lalang. L. M. Potter provided a general timeline of the economic and cultural significance of lalang in the local economy in contrast to its classification as an unwanted weed for colonial planters.[23] Considering the issue during the height of colonial expansion in Southeast Asia, this article will contribute to the study of lalang by evaluating its changing roles in the capitalist form of agricultural production as a challenge to the "epistemic imperialism" of the monocrop plantation model centred around one plant.[24] While some scholars have focused on the dynamics between settler colonial governments and the complexity of interspecies relations, my decision to focus on British Malaya is informed by scholars who highlight the distinctiveness of the tropical environment in Plantationocene discourse. Maureen Sioh identifies how the ecologically diverse Malayan forests alongside their multiracial demography are reconfigured and commodified as a workforce for the plantation complex and the colonial state-making agenda.[25] This is echoed by Barua, who compares the difference between the system

21 Jennifer Atchison and Lesley Head, "Eradicating Bodies in Invasive Plant Management," *Environment and Planning D: Society and Space* 31, no. 6 (2013): 955, https://doi.org/10.1068/d17712.

22 Peter Triantafillou, "Governing Agricultural Progress: A Genealogy of the Politics of Pest Control in Malaysia," *Comparative Studies in Society and History* 43, no. 1 (2001): 194, https://doi.org/10.1017/S0010417501003644.

23 L. M. Potter, "The Dynamics of *Imperata*: Historical Overview and Current Farmer Perspectives, with Special Reference to South Kalimantan, Indonesia," *Agroforestry Systems* 36 (1996), https://doi.org/10.1007/BF00142866.

24 Chao, "The Beetle or the Bug?," 478.

25 Maureen Sioh, "Authorizing the Malaysian Rainforest: Configuring Space, Contesting Claims and Conquering Imaginaries," *Ecumene* 5, no. 2 (1998): 145, https://doi.org/10.1177/147447409800500202.

of indentured labour common in Asia and the slave-based production of the Atlantic plantations.[26] By tracing the different portrayals of lalang and a lalang-covered place in the colonial archives of British Malaya, this research sets out to understand how systems of rubber and weed management are informed and shaped by the unpredictable movement of plants. Subsequently, this case study uncovers the ways scientific studies of the local biota and the commercial interests to maximise profits collectively justified the exploitation of land and bodies by reconfiguring tropical landscape as places of "savagery, pathogenic threat and the prospect of white degeneration."[27]

"Lalang and Chinaman": Persistent Weeds and Racialisation

According to the Singapore National Parks Board, *Imperata cylindrica*—commonly referred to as lalang in Malay or cogongrass in English—is a "tall perennial grass" that could grow from 0.2 to 2.0 m in height, with a large underground stem very difficult to uproot. Native to Southeast Asia, the plant has been used by the local Malay and Chinese populations to treat cough and diarrhoea. Seen as a fixed feature of Southeast Asian landscapes, *Imperata cylindrica* is often referred to directly as "lalang" in colonial periodicals as early as the mid-nineteenth century, emphasising its origin as an invasive plant in rubber cultivation and its alien status outside of the European binomial system of plant classification.[28] Lalang is often referred to as the "bleeding weed" by European scholars in colonial newspapers, its razor-sharp leave edges easily making cuts on human skin, its roots making rubber plant decay, and requiring immediate elimination, which unveils the colonial logic in constructing and conditioning certain plants as an invasive, undesirable weed.[29] Acknowledgement of the dangers of lalang appeared in the *Agricultural Bulletin* as early as the first issue in October 1901, as part of the general introduction to the timbers of the Malay Peninsula.[30] The author locates the growth of lalang in forests that were felled and burned but abandoned, foregrounding the unexpected consequences of human transformation of the forest. Usually reforested by secondary growth trees with no external intervention, the constant burning of forest for cultivation and plantation instead created patches of ground dominated by lalang.[31] Sometimes, lalang would even dominate the land that had not undergone burning. This attempt to explain the rise of lalang introduces a collection

26 Barua, "Plantationocene: A Vegetal Geography," 36.

27 Greatrex, "'Back to the Jungle,'" 340.

28 *The Journal of the Indian Archipelago and Eastern China* 3 (1847): 369.

29 *Agricultural Bulletin* 3, (1904): 267.

30 *Agricultural Bulletin* 1, (1901): 2.

31 *Agricultural Bulletin* 1, (1901): 3.

of undesirable conditions, such as dry weather and remains of seed on the surface of the soil, which supposedly predict the spread of pests and justify colonial encroachment of the physical environment.[32] This description of the persistent reproduction and movement of lalang is confirmed in a report on *Termes gestroi* by Herbert C. Robinson, a British zoologist employed as curator in the Selangor State Museum in Kuala Lumpur in 1904, who summarises all wood pests threatening the health of para rubber.[33] Equally dangerous as the *Termes carbonarious*, a species of termites that eats up the roots of rubber, Robinson emphasises the strength of lalang grass to "become very abundant pests for any great strength of time in one spot."[34] Moreover, Robinson describes the physical characteristics of lalang that allow it to adapt and protect itself from eradication from natural disturbances such as fire.

> Lalang chiefly holds the ground by virtue of its having its persistent rhizomes at a considerable depth below the surface of the soil. The leaves and flower stalks are very inflammable when dry, and in many places being often fired any other competitive weeds growing through it, together with their seeds lying on the surface of the ground, are destroyed, while the lalang itself is unhurt, and immediately shoot up again.[35]

This description of lalang confirms the human construction of "weeds" as a metaphor of disorder used to establish a dichotomy between a local yet "highly destructive" plantation weed needing intervention and economically valuable species such as rubber as victims of the threatening weeds.[36] The image of the vegetal body of lalang with "rhizomes" capable of extending into the roots below the soil points to a plant agency that escapes from human surveillance. This study of the physical characteristics of lalang reveals the impact of continued lalang growth on landscape transformation that persists and multiplies under colonial rule. Description of the way lalang clings onto roots also speaks to the entanglement of rubber and lalang, where the weed ends up "parasitizing" the same cash crop that cultivated the ecological environment conducive to their thriving.[37] Rather than simply being an "invasive weed" that destroys rubber trees, the movement of lalang in plantation soil highlights the complex symbiotic relations embodied by the plant, which can be "threatened by, threatening to, or thriving" with the

32 Triantafillou, "Governing Agricultural Progress," 201.

33 Herbert C. Robinson, *Agricultural Bulletin* 3, (1904): 478.

34 Robinson, *Agricultural Bulletin*, 478.

35 Robinson, *Agricultural Bulletin*, 490.

36 Lucia Argüelles and Hug March, "Weeds in Action: Vegetal Political Ecology of Unwanted Plants," *Progress in Human Geography* 46, no. 1 (2022): 46, https://doi.org/10.1177/03091325211054966.

37 Chao, "The Beetle or the Bug?," 480.

plantation.[38]

This reference by planters to a persistent lalang on abandoned, emptied forest land directly attributes the emergence of lalang-covered land to the alleged carelessness and laziness of local people previously responsible for it. This attribution in turn serves to justify the need for colonial governance of both the landscape and people to upkeep a clean and orderly garden in the form of the rubber plantation. Starting from 1903, there are multiple entries in the local newspaper by British planters and plantation shareholders who are discontent with the local Chinese and Malay methods of weed management. Edgar G. Money, an engineer and shareholder of a British property and industrial agency Messers Boustead Bros, directly points to the Chinese as the cause of such overflowing lalang wasteland in an interview with the *Straits Budget*.[39] Like the Malay, the Chinese obtained these large blocks of land to grow tapioca. As soon as they exhausted the soil with tapioca plantations, they "quietly moved on to another plot of their block, leaving the first to stand as they had left it," subsequently resulting in "a tremendous lot of land in certain districts had been abandoned and covered with lalang."[40] This discourse of abandonment and inaction with the Chinese and Malay planters points to the instrumentalization of lalang to forge a hierarchy of land use and human-nature relationships with the Chinese and Malay people as subordinates.[41] Moreover, the background of Edgar G. Money as shareholder of a property agency with branches based in Mombasa and Zanzibar points to the interregional information networks connected by empires and the intersection of botanical studies and industrial interests.[42] Similarly, an article titled "Malaya: The Boom in Rubber, No Help from Government," published in the *Straits Budget* in 1906, highlights this dynamic of action and discipline.[43] Resonating with the previous complaints on unequal land selection policies, the author expresses the potential for rubber industries in the Federated Malay States (FMS) but complains about the "improvident Malays" who "had never been taught the virtue of thrift" and were induced to plant whatever was seen as profitable, such as coffee.

> When the slump came in coffee the Malay lost heart, allowed the insidious lalang grass to creep into his plantations, which he was too lazy to weed himself; so that today between Prai and Taiping and port Swettenham and

38 Chao, "The Beetle or the Bug?," 478.

39 *The Straits Budget*, April 5, 1906, 6, https://eresources.nlb.gov.sg/newspapers.

40 *The Straits Budget*, April 5, 1906, 6.

41 Sioh, "Authorizing the Malaysian Rainforest," 152.

42 *Europeans in East Asia*, accessed March 28, 2025, https://www.europeansineastafrica.co.uk/_site/custom/database/default.asp?a=viewIndividual&pid=2&person=269.

43 *The Straits Budget*, January 11, 1906, 4.

> Kuala Lumpur the traveller on the Malay states Railway is treated to a vision of acres of ruined coffee estates which might today have been just coming into bearing with a rich crop of rubber had only their owners been less thriftless and the government more paternal.[44]

The supposed laziness and shortsightedness of the Malay people following the harvest is considered as the causality of the lalang wasteland around the FMS, and suggests how weeds became a "bureaucratic category" that divided the native villagers from British cultivators by their level of progress with weeding, justifying the need for intervention and restoration.[45] Moreover, the sensitivity and knowledge in regard to commercial potential and management of rubber cultivation suggests the weed as a mediator of commodification and scientific knowledge production. Indeed, the section concludes in a hopeful tone.

> Fortunately, for the future agricultural prosperity of Malaya, the European planters and their own or two Chinese fellow-craftsmen were made of sterner stuff than the Malays. They grumbled and they growled as only Britons can, and they looked matters squarely in the face, cut down expenses whenever possible, put in fresh crops of products to take the place of the useless coffee, and sat down to wait for the better times which are now dawning.[46]

Putting the blame for the sight of "ruined coffee estates" on Chinese and Malay inaction to lalang growth highlights the supposed diligent nature of British planters. This binary categorisation is then used to confirm the undesirability of both weeds and certain groups of people and highlights the need to eliminate both such species of backwardness and uncontrollability. In an article published in *Straits Echo* on 21 December 1907, Mr John. B. Carruthers, Director of Agriculture in the FMS, is recorded to have said that "while the Malay Peninsula was excellent, but the things on top of it we could do without—lalang and Chinamen."[47] In considering the categorization of "native" and "introduced" plants, Mardi Reardon-Smith references the settler-colonial logic behind the temporal threshold of using such categories in the Australian context, where establishing a temporal boundary based on European colonisation of the land means all species present before European colonial are considered "native" and those arriving afterwards as "introduced."[48] This conception of a "natural, native landscape" erases the

44 *The Straits Budget*, January 11, 1906, 4.

45 Argüelles and March, "Weeds in Action," 47.

46 *The Straits Budget*, January 11, 1906, 4.

47 *Straits Echo*, December 21, 1907, 4.

48 Reardon-Smith, "In the Weeds," 664.

historical settlement and plant cultivation by Aboriginal people and serves to advance the project of dispossession and expropriation of their resources.[49] This theory can be applied in the Malay context, in associating lalang with Chinese inhabitants as two species embedded in the Malay landscapes, it serves to justify the colonial agenda to eliminate all existing bodies on the Malay Peninsula, also diminishing the agency of Malay and Chinese inhabitants in understanding and managing the local biota before European arrival. Relating to the imaginary of "*terra nullius*" behind claims of pest control, lalang-covered lands are seen as unoccupied, abandoned territory available for development, which legitimises the dispossession of indigenous land and resources for crop economies.[50]

Lalang and Methods of Eradication: Consistency and Vegetal Work

Implicit in the description of the lazy Malay and Chinese who spoil the land is a concern with the labour required to eradicate lalang. Numerous experiments on lalang extirpation appeared in the *Agricultural Bulletin*, with an emphasis on the value of patience and repeated action for lalang eradication. In *The Rubber Tree Book*, written and published by William F. de Bois Maclaren in 1913, Maclaren highlights how "the smallest portion of a root left in the soil when weeding starts a fresh and vigorous growth" and usually extend the roots at six to twelve inches below the surface strangling all other vegetation.[51] Using the saying "one year's seeding, five years' weeding," he stresses the importance of a "system and persistent effort" of hoeing as the only way to eliminate lalang.[52] This process of patiently loosening the soil and digging out the lalang roots with blades also requires a spatial reconfiguration, where lalang-covered land is often divided into blocks of small patches that will each be "thoroughly well chankolled over during the first three weeks" and repeated multiple times.[53] This process of completely clearing the land before introducing the target species is called clean weeding, a practice common on colonial estates, which implies a colonial ideology of cleanliness and pristine nature made available for agricultural production.[54] The same method of repeated, careful repetition of weeding is emphasised in the book, *The Cultivation of Hevea: A Manual for the Planter*, published in 1911 and written by Dutch merchant and entomologist Pieter Cramer.[55] On top of producing

49 Reardon-Smith, "In the Weeds," 664.

50 Reardon-Smith, "In the Weeds," 664.

51 Maclaren, *The Rubber Tree Book*, 222.

52 Maclaren, *The Rubber Tree Book*, 222.

53 Maclaren, *The Rubber Tree Book*, 222.

54 Kathirithamby-Wells, "Peninsular Malaysia," 372.

55 Cramer, *The Cultivation of Hevea*.

a clean garden, clean weeding was seen as the cheapest method of weed management, if it was carried out "systematically from the beginning of the work and no pains should be spared to this end."[56] This emphasis on the cost-effectiveness of constant ploughing draws attention to the Plantationocene, which entails the collective exploitation of plant and human labour, embedded in the method of clean weeding.[57] This human and more-than-human labour is mentioned in the article "Suggestions on Planting: Machine Cultivation to Save Hand Labour" written by C. C. Malet.[58] In the first round of ploughing, one disc plough is attached to a good team of oxen, which will plough up 50 acres of lalang land in about three months. The spaces around the trees that cannot be touched by the ploughs will have to be cut down by hand and completely cleared away.[59] After the second round of the disc harrows was employed, a small amount of hand labour will once again be employed around the trees where the machine could not reach.[60] The materiality of the "weeded land" and characteristics of the lalang's body, which resurfaces after rain, suggests the agency of lalang and the soil as active participants in structuring and patterning plantation time according to their metabolic processes.[61]

Indeed, the labour condition of plantation workers is rarely mentioned in the calculation of weeding costs, which highlights the racialised exploitation of labour power in the violent colonial pursuit to transform nature into resources. Plantationocene discourse is concerned with ecological or environmental disruption caused by human control over nature.[62] In an interview with Mr. Herbert Wright, the editor of the *India Rubber Journal*, in *The Straits Times*, Wright was asked about any labour difficulty in the Federated Malay States, to which he replied with "absolutely no scarcity of labour" and for a few estates a surplus as "the native population is large and industrious," and the tobacco fields cultivated mainly "by the Chinese, Japanese, and a few Malays being used for the rubber estates."[63] This lack of difficulty with labour management is affirmed in another interview with C. Bowle Evans, who was interviewed by a representative of the *Ceylon Observer* after returning to Ceylon from the Straits.[64] When asked about the labour problem, Evans considers the three-year indenture system implemented in Sumatra as "one of the best labour forces" as the Javanese employed "are freely re-indenturing themselves

56 Cramer, *The Cultivation of Hevea*, 45.
57 Barua, *Plantation World*, 36.
58 *The Straits Budget*, July 14, 1910, 8.
59 *The Straits Budget*, July 14, 1910, 8.
60 *The Straits Budget*, July 14, 1910, 8.
61 Barua, "Plantationocee: A Vegetal Geography," 19.
62 Barua, "Plantationocee: A Vegetal Geography," 26.
63 *The Straits Times*, June 24, 1908, 2.
64 *Straits Echo*, June 30, 1909, 6.

for a further three years," and "the manager always knows the available labour force for tapping, whereas with the ordinary labour forces or a village community, you never know how many tappers may be available."[65] Described by Maan Barua as the "new system of slavery," the favouring of indentured labour over the local workforce displays the land dispossession experienced by local villagers as they are pushed away from forests and the source of their livelihood.[66] Meanwhile, the migrant Javanese workers, like the Adivasi community brought from central and eastern India are "immobilised in coolie-line resembling barracks"[67] in the plantation landscape as a productive workforce in service of an "uneven racial-colonial economy."[68] The heavy, continuous labour required on the plantation field influenced colonial labour organisation, where Javanese migrant workers were preferred by colonial officials as "cheap, plentiful and easily disciplined" labour.[69] Evan's remark on local and Javanese workers highlights the ways through which lalang eradication became a technique of the colonial environmental governance to discipline and regulate labour, as well as to rationalise the dispossession of indigenous land and resources.[70]

Simultaneously with the forced human labour, lalang eradication involved vegetal work in the form of vegetation cover, where other weeds are employed to destroy lalang. This vegetal work once again foregrounds the encounter between vegetal agency and the colonial reordering of ecosystems, favouring one species over another on the basis of economic utility.[71] The use of vegetation cover as pest control partially arose from a limitation of clean weeding to accommodate the multiple environments of the FMS. Specifically, it was discovered that ploughing on landscapes with steep slopes subject to severe washes of soil would remove the surface soil rich in vegetable humus.[72] It was thus a concern for botanists to find light and "harmless grasses and weeds" that could serve as protective weed covering to keep the surface of the soil moist while preventing the growth of harmful weeds.[73] *Mimosa pudica* was one of the species favoured as an effective and cost-efficient weed cover. A native of Brazil but acclimatised and growing luxuriously in the FMS, *Mimosa pudica* is a leguminous plant carrying nodules that can branch from a single stem, a covering that can spread up to seven feet in every direction

65 *Straits Echo*, June 30, 1909, 6.
66 Barua, *Plantation Worlds*, 36.
67 Barua, *Plantation Worlds*, 20.
68 Barua, *Plantation Worlds*, 27.
69 Barua, *Plantation Worlds*, 20.
70 Barua, "Plantationocene: A Vegetal Geography," 18.
71 Triantafillou, "Governing Agricultural Progress," 198.
72 Maclaren, *The Rubber Tree Book*, 225.
73 Maclaren, *The Rubber Tree Book*, 225.

over the surface of the soil to about six inches in height.[74] These nodules have valuable fertilizing properties, such as nitrogen, which are added into the soil after ploughing. They were specifically planted in belts down the centre of the avenues between the rows of trees to allow "coolies" to walk up and down the rows of trees.[75] This also means that these South Indian workers hired by the colonial government on indentured contracts often had to endure the cuts made by thorns of the *Mimosa pudica* plant.[76] However, their thorns that can bend down lalang also meant the "coolies" responsible for ploughing had to be provided with shoes and "wrap strips of old garments round their legs to preserve them from being severely scratched as they walk over the mimosa while beating it down."[77] This measure exhibits the labourer's body as an assemblage of plant and human bodies as the *Mimosa pudica* thorns cling to the garments worn by the human labourer.[78] Similarly, the constant need to correct the height of the plant every twelve to fifteen months to maximise its efficiency as covering legitimises human interference on vegetal growth for maximal efficiency during its own process of regeneration.[79] This mutual influence between human and plant bodies signifies the interspecies "entanglement" in which plant growth subverts plantation time and is also subjected to the demands of monocrop plantations.[80] In other words, while the uncontrollable growth of the weeds inflicts changes on human bodies and coerces them into forced labour, the factory mode of commercial weed management also regularises and "re-orient[s] the time of vegetal life" and their bodies to fit the time and labour required for rubber production.[81] In this way, vegetal bodies in rubber plantations display the possibility of monocrop plantation as active sites of cross-species transformations where the bodies of *Mimosa pudica* can release nitrogen as nourishment to the soil and acquire parasitic qualities as it attaches onto lalang and human bodies.[82]

Another plant used for lalang eradication as well as protective covering across FMS rubber plantations is passion flower, *Passiflora foetida*, a plant native to the Americas, introduced and naturalised in Singapore because of its ability to climb over other plants and smother and bear them down as the

74 Maclaren, *The Rubber Tree Book*, 231.

75 Maclaren, *The Rubber Tree Book*, 233.

76 Viswanathan Selvaratnam, "Malaysia's South Indian 'Coolies': Legacies of Imperialism, Colonial Capitalism and Racism," in *Contesting Malaysia's Integration into the World Economy*, ed. Rajah Rasiah, Azirah Hashim, and Jatswan S. Sidhu (Springer Singapore, 2021): 170, https://doi.org/10.1007/978-981-16-0650-2_8.

77 Maclaren, *The Rubber Tree Book*, 233.

78 Atchison and Head, "Eradicating Bodies," 955.

79 Barua, "Plantationocene: A Vegetal Geography," 20.

80 Reardon-Smith, "In the Weeds," 4.

81 Barua, "Plantationocene: A Vegetal Geography," 19.

82 Chao, "The Beetle or the Bug?," 478.

weight of leafy matter increases.[83] An article written by M. Kelway Bamber, an English locomotive engineer of the East Indian Railway, on the *Agricultural Bulletin* in 1909 detailing the cultivation of *Passiflora foetida* to keep down other weeds, considers the traditional practice of a native tribe known by a planter in Selangor.

> Tying large double-handful of the growing grass together with a few blades of the grass itself. This completely prevents growth, and the rain in the tied bundle soon rots the growing points. By planting cuttings or seed of the Passiflora between the bundles, the whole field will be over-run in a few weeks or months and the lalang entirely destroyed.[84]

This method is emblematic of a "plantiness" described by Head, where plant bodies morphed and become an assemblage of "shared differences from other beings" with changing material forms.[85] Instead of a linear enlargement from one single characteristic, plants like passion flower grow in a nonlinear way that builds "assemblies or confederation" with other material forms and members.[86] This plant corporeality is further exemplified in the way the grown passion flower at a height of twelve inches to eighteen inches "can be rolled up like a huge carpet, leaving the surface soil in a perfect loamy condition, and quite clean and free from weeds."[87] The physical transformation of the plant body from a singular plant with extended tendrils underground to a "blanket" constituted by multiple species of weeds suggests the way plants are processes of becoming that constantly shift between specific modalities and are altered by interactions with the capitalist demands of efficient weeding.[88]

Lalang and Alternative Uses of "Weed": Land Transformation and Fluid Plant Bodies

This idea of the plant bodies as contingent to changes in their surrounding environment and species also implies the potential change of their identification as a weed in the colonial plant management regime. Another demonstration of the fluid vegetal body of lalang and the subsequent changing concepts of weeds can be seen in scientific investigations of lalang paper. In 1907, H. N. Ridley wrote in the *Agricultural Bulletin* about the potential of "lalang as a paper material."[89] In the text, Ridley identifies the

83 *Agricultural Bulletin* 8, no. 4 (1909): 8.

84 Kelway Bamber, *Agricultural Bulletin* 8, no. 6 (1909): 263.

85 Atchison and Head, "Eradicating Bodies," 955.

86 Atchison and Head, "Eradicating Bodies," 955.

87 Kelway Bamber, *Agricultural Bulletin*, 263.

88 Atchison and Head, "Eradicating Bodies," 955.

89 Henry. N. Ridley, *Agricultural Bulletin* 6, no. 11 (1907): 379.

value of "this too abundant grass" as a paper-making material.[90] As early as 1891, a concession for lalang papermaking was obtained from the Sultan of Johore, which encouraged experiments on lalang grass and the construction of a factory about four or five miles west of Johore towns and other factories on the east coast and neighbourhood of Muar to work the grass.[91] This early establishment of experiment centres to investigate the commercial potential of local resources points to the expansion of colonial authority through both the ideas of resource development and the physical construction of sites of industrialisation. Ridley highlights how the cost of cutting and delivery of lalang was estimated at less than ten shillings a ton, but the "paper manufacturers of high standings who have experimented on lalang grass have classified it as being equal to the best qualities of Esparto."[92] The transition to valuing lalang as a raw material with great economic utility once again demonstrates the fluid state of vegetal bodies contingent on their interactions with the capitalist agenda. A more detailed account of the Lalang Concession of 1891 and the potential of lalang paper is given in 1908 by Clayton Beadle, an English chemist specialising in papermaking, in the *Agricultural Bulletin*.[93] The Johore Malay Peninsular Papermaking Concession granted by H. H. the Sultan conveyed the following:

> To the Concessionaire, or to whomsoever he may assign it, a monopoly utilise for the manufacture of paper, Lalang grass and all fibrous plants that are indigenous or can be cultivated in the territory of Johore for the terms of 55 years, free of rent, taxes or import duty of any kind, in consideration of establishing the papermaking industry in the territory, and turning Lalang grass known as the pest of the country, into a valuable commercial product.[94]

This concession gave the European planters access to factory sites and permission to build roads to enhance inter-empire communication, which brings attention to the relationship between the classification of weeds, the reordering of landscapes considered idle, and commercialized agriculture. This expansion of access to the larger landscape of Johore for the cultivation of lalang and potentially rubber constitutes a process of colonial "territorialization," surveying and carving up the biota to expand the colonial rubber enterprise and systems of scientific knowledge.[95] As a result, according to Sioh, rubber estates monopolized agriculture by 1910, whether cash or

90 Ridley, *Agricultural Bulletin*, 379.

91 Ridley, *Agricultural Bulletin*, 379.

92 Atchison and Head, "Eradicating Bodies," 955.

93 Clayton Beadle, *Agricultural Bulletin* 7, no. 1 (1908): 177.

94 Beadle, *Agricultural Bulletin*, 178.

95 Sioh, "Authorizing the Malaysian Rainforest," 151.

subsistence, occupying 62 percent of the cultivated land and had become a "natural feature of [the] Malaysian environment."[96] Through the enactment of "the lalang clause," one can see how the lalang forms parts of "a mosaic of changing vegetation types" which are transformed in different directions by human activity.[97] While previously abandoned as infested land after cropping, lalang grasslands were now resources being reconfigured and engulfed by government-induced commercial competitions.[98]

While the earlier hostility towards lalang was driven by colonial modification of "untouched landscape," the return of lalang as a resource signals the constant reconfiguration of weed management in colonial commercial interests. In the book *My Tour in Eastern Rubber Lands* by Herbert Wright, written in 1908, the renowned planter describes how, at the end of the decade, planters seem to begin favouring lalang land for rubber cultivation because of its "absence of tree stumps in the soil and the relative immunity from the root fungus and white ants which such a condition gives."[99] This observation is significant, as the previously undesirable features of lalang were now regarded as advantages owing to scientific advances in weed control. The problem of parasitic fungi on rubber is explained in detail by H. N. Ridley as early as 1904 in the *Agricultural Bulletin*.[100] Primarily focusing on the fungus named *Fomes semitostus*, Ridley describes how the disease was discovered after "coolies carelessly made a large bonfire close to a row of Para rubber trees," which left the trees next to the burnt stocks sick, where the "large mass of the fruiting stage of *Fomes semitostus* was seen at the base of the trunk just pushed up above the ground and the roots being destroyed the trees perished."[101] While still perpetuating the racialising logic that associates disease with the carelessness of indentured labourers, the attacks of *Fomes semitostus* are different from lalang as it appears very slowly and is described as "contagious as opposed to an infectious fungus, as it appears to spread from root to root in the ground without being dangerously dispersed through its spores."[102] This changing preference is confirmed in a progress report in the *Agricultural Bulletin* in 1910, where planters are described to be "stubbing their estates with a view of destroying the parasitic root-fungi remaining in the ground from the relics of the original forest trees," choosing to plant on formerly despised lalang land for the same reason of it "being quite free of underground wood

96 Sioh, "Authorizing the Malaysian Rainforest," 151.

97 Potter, "The Dynamics of *Imperata*," 37.

98 Potter, "The Dynamics of *Imperata*," 38.

99 Wright, *My Tour in Eastern Rubber Lands*, 73.

100 Henry. N. Ridley, *Agricultural Bulletin* 3, (1904): 174.

101 Ridley, *Agricultural Bulletin*, 174.

102 Ridley, *Agricultural Bulletin*, 174.

and roots, likely to carry fungi."[103] This renewed interest in lalang land signifies the flexible and constructed nature of ideas of "invasiveness" as based on evolving economic priority.[104] More importantly, the "contagious" spread of *Fomes semitostus* through contact with infected stumps and the living roots of the rubber covering also suggests a vegetal agency of the fungi as well as rubber plants that traverse "dynamic boundaries," with their ability to move between states of fixture and indeterminacy, versatility, and degeneracy.[105] The failures of planters to weed or remove the disease from underground means the diseased plants will have to be pulled up and burnt completely, which also means the termination of rubber cultivation before the soil is completely disinfected, representing the way vegetal agency subverts the set temporality of rubber plantations that favours efficient timing with vegetal time.[106] Another aspect that this relationship between lalang, *Fomes semitostus*, and rubber brings attention to is the idea of "invasive networks" proposed by Paul Robbins, where the way a group of actors "gathers together, enrolls, and connects human and nonhuman actors (bureaucrats, trees, landowners) under its own momentum" mutually constitute each other and themselves.[107] The invasiveness of fungi and lalang is only relevant through their interrelationship with the soil, farmers, and trees, as well as the colonial governing structures that define and connect this narrative of species invasions.

Conclusion

Overall, this investigation on lalang has shown the violent ways in which the colonial regime of pest and plantation management has defined human-nature relationships and vegetal agency in subverting the homogeneous plantation estate in the first decade of the twentieth century. Specifically, by drawing a causal relationship between the persistence and domination of lalang and the mismanagement of the Chinese and Malay population historically, the scientific community perpetuated a hierarchy of land use based on cleanliness and successful weed management using the European scientific method. A closer look at the proposed solutions to lalang eradication has revealed how this system of weed control relied on the exploitation of land, human, and more-than-human bodies for repetitive ploughing and harvest as well as heterogeneous interspecies relations based on changing notions of economic

103 *Agricultural Bulletin* 9, no. 4 (1910): 132.

104 Reardon-Smith, "In the Weeds," 6.

105 Atchison and Head, "Eradicating Bodies," 955.

106 Barua, "Plantationocene: A Vegetal Geography," 20.

107 Paul Robbins, "Comparing Invasive Networks: Cultural and Political Biographies of Invasive Species," *Geographical Review* 94, no. 2 (2004): 153, https://doi.org/10.1111/j.1931-0846.2004.tb00164.x.

worth and constructed notions of invasiveness that changed throughout the period. However, vegetal agency and the uncertainty of ecological disturbances that subverted plantation time based on commercial demands and imposed spatial boundaries demonstrate the narratives of negotiation and friction central to understanding the agricultural production of rubber.