HISTORY OF EDUCATION, 2016
VOL. 45, NO. 5, 587–601
http://dx.doi.org/10.1080/0046760X.2015.1130268

Routledge
Taylor & Francis Group

Agricultural education as a medium for the transmission of Western science during British rule in Malaya, 1905–1957

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ABSTRACT

This paper traces the transmission of Western science through the agricultural education sector during the British colonial administration of Malaya. This education system included three levels: elementary, intermediate and the school of agriculture. To understand the process by which Western science was transmitted in Malaya, Basalla's model was adopted to clarify the vectors of Western science and the types of knowledge disseminated by these vectors, and to identify the mechanisms sustaining scientific research activities outside Europe. This paper shows that the transmission and the diffusion of Western science through education were highly centralised under the British colonial umbrella and closely associated with the agricultural economy.

ARTICLE HISTORY
Received 24 April 2014
Accepted 7 December 2015

KEYWORDS
Agricultural education; colonialism; Malaya; transmission; Western science

Introduction

Science and technology are not merely great projects or artefacts but also include knowledge and activities. A complete diffusion of science and technology involves the spread of activities and knowledge from one geographical area to another and from one people to another. Education, schooling and learning constituted a significant means whereby colonial governments and enterprises taught basic skills through industry, public works, railroads, and particular programmes in trade schools and apprenticeship programmes, as can be seen in the agricultural sector.

The transmission of science to the Malay[1] was initially conducted through colonisation, especially through the bureaucratic governmental entities such as research institutes and government departments. The establishment of scientific research institutions constituted a form of 'technology transfer', and some of the earliest Research Institutes established by

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[1]Under British administration and before the formation of the Malayan Union in 1946, Malaya comprised the Federated Malay States (FMS) (Selangor, Perak, Pahang, and Negeri Sembilan); the Unfederated Malay States (UFMS) (Johor, Kedah, Kelantan, Perlis, and Terengganu); and the Straits Settlement (SS) (Malacca, Dinding, Penang, and Singapore). H. C. Belfield, *Handbook of Federated Malay States* (London: Edward Stanford, 1902); and R. O. Windstedt, *Malaya: The Straits Settlements, The Federated and Unfederated Malay States* (London: Constable & Co., 1923)

the British included the Institute of Medical Research, the Rubber Research Institute, the Forest Research Institute and the Department of Agriculture (DOA).

The establishment of the DOA in the Federated Malay States (FMS) in 1905 institutionalised agricultural research and experimentation in Malaya and marked the inauguration of formal agricultural education by the British administration. The DOA was established under the Government Agricultural Policy. The recommendation for establishing an experimentation centre had been proposed as early as 1899 by the United Planters Association of the FMS, which believed that the government should render greater assistance to agriculture by creating a department to organise research on various products that could aid European and native cultivators and to provide reliable information to those who might be induced to become cultivators.[2] Therefore, this article will focus on agricultural education in Malaya from the establishment of the DOA in 1905 to the end of British rule in Malaya in 1957.

The education system served as an important channel for the transmission of Western science, which occurred through formal agricultural education that closely followed the Western model. The second method of transmission occurred via long-distance communication technologies such as radio, journals, circulars and bulletins. The third method involved 'learning by doing', or participation in the execution of industrial projects. The repair, maintenance and adaptation of imported technologies may facilitate the indigenisation of transferred skills.[3]

The Europeans' 'investment' in science practices in their colonies was intended to support and serve their economic and political objectives. The scientific and technical departments in the colonies were devoted to researching colonial problems and to the training of colonial scientific personnel. For example, in the French Empire, the erection of meteorological observatories facilitated the movement and health of imperial agents and the development of cash-crop agriculture. In other words, 'the choice between strategies, and their supporting research programmes, knowledge, and practices, was dictated by tangible social considerations'.[4]

Using primary sources from the National Archives of Malaysia, this article explains the transmission of Western science, particularly through education, from the West (and, in this case, from the British) to Malaya during British colonial rule and investigates the rationalisation of Western science in the agricultural sector.

The transmission of science and technology to non-Western territories

George Basalla's *The Spread of Western Science*[5] proposed a model to explain the transmission of modern Western science into non-European nations. This model offers an appropriate starting point for understanding the process of the transmission of Western science to other parts of the world.[6]

Basalla asserts that to understand the diffusion of Western science to non-European territories it is crucial to examine three dimensions: (1) identify the vectors or agents of

[2]J. H. Drabble, *Rubber in Malaya 1876–1922: The Genesis of the Industry* (Kuala Lumpur: Oxford University Press, 1973), 45.
[3]Tidiane Boye and Maimire Mennasemay, 'Skill Transfer and African Development: A Conceptual Research Note', *Journal of Modern African Studies* 26, no. 4 (1988): 688.
[4]Paolo Palladino and Michael Worboys, 'Science and Imperialism', *Isis* 84, no. 1 (1993): 97–8.
[5]George Basalla, 'The Spread of Western Science', *Science* 156 (1967): 613–17.
[6]Dhruv Raina, 'From West to Non-West? Basalla's Three-stage Model Revisited', *Science as Culture* 8, no. 4 (1999): 499.

Western science; (2) identify the 'type of knowledge' and 'what knowledge' these vectors purveyed to non-Western regions; and (3) identify the mechanisms through which scientific research systems and research activities were sustained outside Western Europe.

Macleod[7] considered the establishment of modern scientific institutions as the medium for the expansion of modern Western science. The definition of scientific activities expands beyond natural history to research on plants, crops and medicine. In Malaya, the British established the Institute of Medical Research and the Rubber Research Institute, where colonial science chiefly took the form of research on tropical diseases and rubber, respectively.[8] Macleod explained that Basalla's model should reflect an economic reality and must be able to describe the political characteristics of scientific activities in the context of 'intellectual colonisation'. Basalla's model has been criticised by some who argue that Basalla was 'preoccupied with the spread of modern Western culture throughout the world, without recognizing that the meaning of science changed across cultures, and within cultures across time'.[9]

In Macleod's discussion of Basalla's model, he offered six critiques: (1) Basalla's model did not differentiate between societies and the resulting differences in cultural environments; (2) the model was homogeneous and linear, and it totalised the Western scientific ideology that was spread to non-Western countries without taking into account 'south–south' or inter-colonial movement or movement between the colonies of one country and other European countries; (3) it did not explain how political and economic factors altered and influenced the three phases; (4) it did not explain how the relations among technological, social and economic developments placed science at the centre of modern culture; (5) it did not regard the cultural dependencies that lingered long after formal colonial ties were thinned or severed; and (6) it did not take into account that science can mask the economic interdependencies created by empire in the Third World.[10]

Basalla[11] proposed a universal model for the diffusion of Western science. This model begins with the initial phase of the exploration of new lands. During this phase, particular colonies provided raw data and materials for scientific research and analysis in the West. The diffusion process continued through dependence science or colonial science, in which scientific activities were conducted in the colonies. In the third phase, the transmission of modern Western science was completed, accompanied by attempts to achieve independent science. Basalla's model remains influential, but since the 1970s several critics have noted that science was a tool of imperial control rather than the key to development.[12]

Position of agricultural education under the British colonial government

Considerable attention was devoted to the development of Asiatic agricultural education during the post-First World War development period (1918–1926). The aim was to improve

[7]Roy Macleod, 'On Visiting the "Moving Metropolis": Reflections on the Architecture of Imperial Science', in *Scientific Colonialism: A Cross-Cultural Comparison*, ed. N. Reingold and M. Rothenberg. (Washington, DC: Smithsonian Institution Press, 1987), 218–49.
[8]Mohd. Hazim Shah, 'Historicising Rationality: The Transmission of Rationality & Science to the Malay States under British Rule' (paper presented at the 16th Conference of the International Association of Historian of Asia, 2000), 10.
[9]Raina, 'From West to Non-West? Basalla's Three-stage Model Revisited', 502.
[10]Macleod, 'On Visiting the "Moving Metropolis"', 226
[11]Basalla, 'The Spread of Western Science', 613–17.
[12]See Mark Harrison, 'Science and the British Empire', *Isis* 96 (2005): 57.

rubber and other forms of cultivation. The appointment of Malay Assistants in the DOA's Field Division considerably increased the importance of the School of Agriculture for the agricultural education of Asiatic staff and improved peasant agriculture via formal education.[13]

According to Grist,[14] an agricultural officer in the FMS, education facilitated development and progress in the agricultural sector, especially rubber cultivation, which contributed significantly to the economy of Malaya, and rice, the staple food in Malaya. However, due to the lack of knowledge about cultivation and neglect of precautionary measures, rubber and rice were often subject to infection by serious plant diseases. It was also difficult to persuade owners to remedy deleterious practices. Another problem arose with respect to the production of padi, a staple rice crop. Under native management, padi was not a profitable crop. It would appear that 'although Malays are an agricultural race, yet they lack the agricultural instinct'.[15]

As stated earlier, the transfer of Western science often took the form of education. The agricultural education offered by the British administration can be divided into three categories: (1) an elementary level, which was developed for small farmers, especially for the Malays and their children who had no formal agricultural education background; (2) an intermediate level, which was created especially for Malay apprentices trained to fill positions in the department as agricultural assistants; and (3) the School of Agriculture, which provided agricultural education suited to the needs of private agriculturists in Malaya and for recruits for junior appointments in the government's agricultural services. The following section describes each stage of education and how knowledge was disseminated to local communities.

Elementary level

The British made several efforts to educate the Malays and improve their agricultural methods and practices. The elementary level consisted of four types of training designed to expose the local population to scientific agricultural education: (1) school gardens; (2) short courses for village headmen and assistant village headmen; (3) the rural lecture caravan; and (4) farm schools.

[13]'Agricultural education can be divided into two types: 1) formal or deliberate, and 2) informal or non-deliberate. Each of these has its major subdivisions grouped according to institutional medium, level or content of instruction, method of instruction, and characteristics of recipients. Formal includes primary and secondary schooling (plus vocational and technical training); college and university (diploma, undergraduate, graduate); adult education; and extension education, community development. Informal includes personal experience, socialization and family, neighbours, business farms, radio, movies, newspapers and other communication or diffusion media.' Clifton R. Wharton, *The Role of Farmer Education in Agricultural Growth* (Singapore: Malaya Publishing House, 1963), 6–7.

[14]Grist was the acting Agricultural Instructor of the Tanjong Malim Training College in 1922. In 1921, he was the Agricultural Inspector of the Federated Malay States and Straits Settlements and studied the country's agricultural education. Prior to this, he was one of the Assistant Agricultural Instructors (source: Memorandum on Salaries in the Department of Agriculture, FMS, September 7, 1918 [DOA, 'Memorandum on salaries in the Department of Agriculture, FMS, September 7, 1918', Memorandum, 1918]. and Letter regarding Papers of Particulars of the Post of Agriculturist, Assistant Agriculturist, Assistant Agricultural Inspector, Assistant to the Director of Agriculture, and Assistant Economic Botanist, February 24, 1919.)

[15]D. H. Grist, 'Upon Agricultural Education in Ceylon, Together with Recommendations Regarding Agricultural Education for Malaya', *Proceeding*, FMS, 1922, C101.

School gardens

School gardens were originally instituted in Perak by an officer of the Educational Department. The extension of such gardens to the vernacular schools was encouraged, and the DOA cooperated with the Education Department by conducting inspections and offering advice on agricultural matters and on procuring suitable seeds.

Soper, a State Agricultural Officer in Selangor, strenuously encouraged Malays to be involved in agriculture. The Malay version of his pamphlet appeared in *Warta Perusahaan Tanah*, and translations were also published in the DOA's Chinese and Tamil Agricultural Journals. His talks were prepared at the request of the Deputy Director of the Broadcast School.

> The important men are those who grow the best food, and the best men of all are those who grow the best food in the best way … you have got to learn all about plants, and about animals too, so you understand what you are doing … also learn the right way to work and how to look after the soil. Growing food is hard work, but it is a good work; it is work which brings pleasure with it. It is a much better feeling to have grown the best bed of beans in the school garden than to be top of your class in arithmetic.[16]

Tending the school garden taught pupils the proper use of tools and correct cultivation methods. It also allowed pupils to observe, to monitor the daily growth of the plants, to identify insects and to watch the birds. Finally, the garden could be used to teach and excite student interest in experimentation. They could practise testing different ways of doing things and observing which method was best.[17] The DOA also played a role in the school gardens, with officers paying regular visits and giving advice. The officer in charge would explain the best planting methods, and the pupils gained experience with the best methods of food cultivation and obtained seeds from the officer. In addition, officials were stationed near the farmers so that they could help them if they encountered problems during cultivation.[18]

The DOA published a quarterly journal in Malay called *Warta Perusahaan Tanah* [Land Development News]. It was printed using the Jawi alphabet. Numerous leaflets in Malay were also circulated throughout the Malay Peninsula. These publications were designed to disseminate current information about local agriculture to the Malay community. For the Chinese community, the DOA published a journal in the Chinese language to share important practical information based on experiments conducted by the Department of Agriculture.

The teaching of elementary agriculture, or Rural Science, as it was called at the Sultan Idris Training College (SITC) in Tanjong Malim, to Malay primary school teachers was the first step in creating awareness of the significance of agricultural education and its importance to the agricultural economy. The teacher was a vital factor and played a key role in delivering knowledge to the community. At the SITC, the teachers' course in agriculture included instruction on methods for imparting agricultural knowledge.[19]

The College was officially opened in late November 1922, and the course in Rural Husbandry commenced in December. Because there were no agricultural instructors in the College, D. H. Grist himself was appointed as an Acting Agricultural Instructor, and

[16]J. R. P. Soper, 'An Introduction to the School Garden', *Malaya Educational Leaflet*, no. 1 (Kuala Lumpur: Commercial Press, 1947), 1–3.
[17]Ibid.
[18]Ibid., 4.
[19]Grist, 'Upon Agricultural Education in Ceylon', 102.

the resident at the College assisted Grist with the training. There were approximately 120 to 190 pupils at that time, all of whom took the Rural Husbandry course.[20]

Rural Husbandry was a practical course designed to give the pupils insight into the nature of soils; the relationship between plants and soil characteristics; the structure of plants and the function of roots, stems, leaves and fruit; drainage and cultivation; crops of native importance; poultry and the proper care of stock; pests; and plant and animal diseases. The course emphasised the importance of developing students' observation skills rather than knowledge of theoretical facts. The students used a textbook, *Ilmu Tanam-tanaman*,[21] written in the vernacular. Each of them also had a garden plot consisting of three 3' x 12' beds. In addition, they had to cultivate two large garden plots and a small grove of fruit trees.[22] Until 1930, there were 341 school gardens at the FMS and 96 at the SS. In Perak alone, by 1934 there were approximately 5000 pupils receiving gardening instruction, and more than 1000 of them had home gardens.

Short course for village headmen and assistant village headmen

The objective of this course was to teach young headmen fundamental agricultural concepts: (1) acquaintance with and handling of a rotary hoe; (2) manure, fertilisers and the making of compost; (3) plant propagation, including knowledge of how to marcot and graft fruit and rubber trees and knowledge of how and where to obtain the necessary materials; (4) rearing of poultry and goats and related knowledge; (5) vegetable gardening, including knowledge of what, where and how to plant and where to obtain seeds; (6) identification of pests and pest control techniques; (7) lectures on padi planting, copra and the use of a copra kiln[23], and rubber cultivation and manufacturing, including clones and how and where to plant them; (8) new crops; (9) rural organisations, including how to conduct meetings and organise small ventures; (10) tours and films to learn about agriculture in other countries; and (11) general lectures on Malay culture and handicrafts.[24]

These special short courses in practical agriculture were designed to teach headmen how to develop and maintain small farms and generate profit. In 1933, this agricultural course for village headmen and assistant village headmen was divided into two parts. The first part of the course was conducted at the School of Agriculture and the Central Experimental Station in Serdang. This part consisted of theoretical instruction and lectures, demonstrations and practical work. The theoretical instruction and lectures were given by the School and encompassed lectures on nature study and poultry, which consisted of caring for young chickens, housing and feeding hens, general treatment of diseases and poultry management. The Co-operative Societies' Department was also involved in the short course. It assisted by delivering lectures on weekly fairs, home gardens, agricultural shows, village credit, village marketing problems and general village improvement.[25]

[20]Sel. Sec. 1150/1923 (A). Memorandum on Agricultural Course at Sultan Idris Training College for Teachers, Tanjong Malim 1923.
[21]Literally 'Gardening Knowledge'.
[22]Sel. Sec. 1150/1923 (A). Memorandum on Agricultural Course at Sultan Idris Training College for Teachers, Tanjong Malim 1923.
[23]Copra is a dried kernel of coconut that is used to extract copra kiln (coconut oil).
[24]No. 1 in Sel. Sec. 1932/1952. Training of Young Ketuas at the School of Agriculture, Serdang, 1952. [No. 1 in Sel. Sec. 1932/1952 is the government's archive file number]
[25]No. 6 in D. A. 97/34 (Sel. G. 283/1934 no. 1). Special Course for Penghulus, 1934. [No. 6 in D. A 97/34 (Sel. G. 238/1934 no. 1) is the government's archive file number]

The demonstrations and practical work were held at the Experimental Plantation. These covered the following topics: (1) fruits, including selection, propagation (sexual and asexual), budding and grafting, pruning of old trees, etiolation, marcotting, layering, and budgrafting; (2) coffee, including varieties, raising from seed, nursery treatment, pruning, preparation for market, and factory processing; (3) tobacco, including varieties, soils, nurseries, cultivation, pest control, topping, suckering, seed production, harvesting, air and flue curing and fermentation; (4) nursery work, including preparation of soil for seed boxes and pots, potting, preparation of seed beds, propagation of plants from cuttings, layering and marcotting, use of shade, use of bamboo points for growing young plants, budding, grafting and etiolation propagation methods; (5) implements, including the use of implements suitable for draught bullocks, such as ploughs, zigzags, harrows, seed drills and hand cultivators. The principles underlying the laying out of fields for ploughing and cultivation were also explained. Instruction was given by four officers from the Station Staff and the Junior Lecturer from the School of Agriculture and was organised by the Senior Assistant Agriculturists. In addition, instruction was organised by the Principal and lectures were given by Malay officers from the School and the Co-operative Societies Department. The practical work was divided among the principal, senior lecturer and the school staff.[26]

There were three alternatives for the second part of the course. The village headmen and the assistant village headmen could choose one of the three alternatives considered suitable and of principal importance in the district where he worked: (1) a course on padi cultivators at Pulau Gadong, Malacca; (2) a course on copra preparation at the Coconut Experiment Station in Klang; and (3) a course on rubber in smallholdings that included instruction on the care and treatment of rubber trees. This course was conducted by the Rubber Research Institute at the DOA in Kuala Lumpur.[27]

The course on padi offered instruction on the preparation sequence needed for padi cultivation; the preparation of nurseries; ploughing, harrowing, fertilising and transplanting; the supply and control of irrigation water, the construction and location of drains, and methods and techniques for water conservation; pure strains of padi and methods of selection, including the advantages and importance of maintaining a pure strain; the reasons for making use of such strains; methods that kampong farmers could use to maintain a pure seed supply; the control of pests; the estimation of yields from measured sample plots and methods for making such plots. These subjects were given extensive treatment both in the lecture room and in the field. The programme also covered various traditional methods of cultivation in different parts of the country. The purpose was primarily to introduce modern methods of padi cultivation and to educate the cultivators regarding the possible disadvantages of strict adherence to traditional methods and old customs, emphasising that certain new practices were essential for successful padi growing.[28]

The lectures and instruction on rubber cultivation were conducted by the Rubber Research Institute in Kuala Lumpur, with special lectures given by the Acting Manager of the Experimental Station and the officers of the Botanical and Pathological Divisions. This course was important for smallholdings because the instructor showed that high-grade rubber can be produced using the basic equipment found in smallholdings and that the

[26]No. 34 in D. A. 802/36. Report on Penghulus' Course 1936 (Sel. G. 458/1936 no. 10a).
[27]No. 17 in D. A. 412/35. Special Course for Penghulus, 1935.
[28]No. 19(B) in Sel. G. 283/1934; and No. 34 in D. A. 802/36. Report on Penghulus' Course 1936 (No. 10(A) in Sel. G. 458/1936).

sheet could be made with traditional apparatus. The instructor also discussed the various faults that should be avoided during the preparation of high-grade rubber.[29]

Rural lecture caravan

The rural lecture caravan project was run by the DOA with the cooperation of the Co-operative Department and the Rubber Research Institute of Malaya.[30] The main purpose of the caravan was to offer instruction to Malays and Indians on agricultural and cooperative subjects through lectures, exhibits, lantern slides and cinematographic films. It was hoped that the use of these mediums would increase Indians' and Malays' interest in the modern applications of agriculture and it is likely that this was achieved.[31] In addition to the demonstration, the caravan played an important role in the All-Malayan Padi Competition, during which lectures were given on how to identify good samples of padi and on the identification of faults and the causes of faults in the samples.[32]

The programmes had two distinct purposes. The first was to arouse the farmers' interest via films that showed improvements in existing agricultural practices. The second purpose was to give detailed information through lectures on specific subjects illustrated by lantern slides or models, specimens and photographs. These films were produced by the members of the department concerned with the cooperation of villagers and a few Malay professional actors, in some cases. The following subjects were discussed: (1) mouldy rot disease in rubber trees; (2) preparation of sheet rubber in smallholdings; (3) a rubber smoke cabinet for smallholders; (4) poultry housing; (5) copra production; and (5) minor crops for smallholders. However, the subjects shown in the films and discussed in the lectures depended on the interests of the audience and the crop or crops of major importance at each centre.[33]

The caravan visits were arranged by the DOA under the supervision of the local Agricultural Officer. The Agricultural Officer arranged the lectures to be given by the Malay Agricultural Assistant and the Asiatic Rubber Instructor, and in certain areas the Malay and Indian Co-operative Officers also gave lectures. Flyers were supplied during the tours.

The rural lecture caravan was successful in introducing scientific and modern methods and their applications to agriculture. It provided new ideas and detailed instruction to interested individuals, who could follow up with the departments and institutes concerned with agricultural matters. Its success was demonstrated by an increase in the production of copra; the preparation of rubber sheets of better quality; the use of small smoke cabinets in various localities; the expanded use of pure strain padi in the main rice-growing areas; and the better housing and care of poultry in some districts. Other benefits included improved cleanliness in surrounding areas, such as mosques and neighbourhoods; the construction of minor irrigation works for padi fields; the destruction of rats, squirrels or wild pigs when such pests were numerous enough to destroy crops; and general benefits to the health and prosperity of the village communities.[34]

[29]No. 25(B) in Sel. G. 283/1934. Memorandum RRIM, September 14, 1934. A. Moore.
[30]J. Corrie and F. G. Spring, 'The Rural Lecture Caravan', *Malayan Agricultural Journal* 19 (1931): 229.
[31]Ibid., 231.
[32]'The Rural Lecture Caravan', *Malayan Agricultural Journal* 14 (1936): 536.
[33]Ibid., 537, 538, 539.
[34]Ibid., 540.

Farm school

Farm schools were instituted in Malay villages in 1938 to provide for the needs of students who intended to cultivate their own holdings. The proposal for a system of agricultural vocational training through farm schools was submitted to the Government by the Director of Agriculture of the Straits Settlements and the Adviser on Agriculture of the Malay States in early 1934.

Farm schools were established in Malacca, Johor and Penang. The courses provided by these schools covered the principles and practices of agriculture suitable for the local conditions.[35] The agricultural education organised by the DOA for the rural population included:[36]

1. extensive training for a few select farmers (three to four months);
2. intensive training for groups of farmers (10 to 14 days);
3. specialised courses confined to one or two subjects, such as poultry, goat rearing, fruit production or padi;
4. lectures and demonstrations to organised groups, such as schoolteachers, schoolchildren, civic groups, women's institutes, Penghulus, and Ketuas;
5. organised visits by DOA teams to selected areas to demonstrate bud-grafting of rubber in Kelantan and bud-grafting of fruit in Lower Perak;
6. 'weekend' courses of two to three days for selected groups;
7. field days at agricultural and padi stations;
8. other agricultural education activities:

    a. farmers' clubs;
    b. rural development boards and committees;
    c. paddy field committee;
    d. newsletters;
    e. services bureau.

The farm school was under the control of a Grade II Malay Agricultural Assistant, who acted as an instructor, and an instructor who had previously served as a junior lecturer at the School of Agriculture. The instruction primarily covered the economic management, development and maintenance of a padi holding.[37] The programme was divided into two parts: (1) class work and (2) field work. The class work helped students learn about the principles of agriculture, field crops, animal and poultry husbandry, arithmetic, economics, and general principles. The accompanying field work included (1) collective work on an adjoining agricultural station; (2) the cultivation of annual crops (1/60th acre per pupil) in individual plots; and (3) demonstrations, experiments and practical work on subjects discussed during the lectures. The course subject matter was made as simple as possible. However, the farm schools failed, undoubtedly because they were not associated with a land settlement scheme designed to accommodate trainees upon completion of their training period.[38]

[35]R. G. Heath, 'The Farm School, Malacca', *Malayan Agricultural Journal* 24 (1936): 227.
[36]No. 88(A) in S.A.O.PK. 145/53. Agricultural Education.
[37]Department of Agriculture, *Annual Report* (1938), para 265.
[38]D.V.S. 203/54, Agricultural Education for Rural Population, Memorandum.

Intermediate level

Beyond the elementary level, the only education available was that provided by the DOA to Malay apprentices who were being trained to fill positions in the Department. This training began in 1925 under a European agricultural instructor with one Malay assistant. It was held at the temporary building near the office of the DOA in Kuala Lumpur. The duration of the course was two years, but the committee found that many Malay apprentices were unable to benefit fully from lectures in English on technical and scientific subjects because of their poor mastery of English and mathematics. The DOA was not satisfied with the results and felt that it was a mistake to have the school in Kuala Lumpur, where there was limited access to suitable land for conducting farm operations and where there were discipline problems among the apprentices.[39]

Another programme was implemented for Malay officers in the DOA with the cooperation of the Director of Agriculture and the Head Master of Malay College in Kuala Kangsa. This programme began on 1 January 1918 and was offered to Malay candidates who passed the annual exam for entry into Class I. The students completed a course of study for a period not to exceed three years. The subjects offered included English; official correspondence, including drafting, precise writing and indexing; typewriting; Malay, including letter writing, composition and translation; Malayan geography; chemistry and elementary physics; botany; geology; and zoology. Students who completed the course in three years and passed the final qualifying examination were appointed as probationers in the DOA. During his period as a probationer, the student was required to improve his scientific and technical knowledge. Before the probation ended, students were tested on the subject they had studied during the probation period. If they passed the examination, they were placed on the pensionable establishment as Junior Agricultural Assistants.[40]

This programme offered a career to a certain number of the rising generation of educated Malays, and their employment in this important department could be of benefit to the country. This programme was part of the government service.[41] At the beginning of 1928, there were 13 first-year and nine second-year apprentices in training. Six of the second-year apprentices passed the necessary qualifying examination held in April and were promoted to the grade of Junior Agricultural Assistant; four assumed duty in the FMS and two in the Colony.[42]

School of Agriculture

The extension of school gardens to the vernacular schools and the teaching of elementary agriculture to trainees at the training college for Malay primary school teachers were the first steps in impressing the significance of agricultural education and its impact on the agricultural economy on rural cultivators. [43]

[39]No. 4 in Sel. 1304/27. Report of Committee Appointed to Draw Up a Scheme for a School of Agriculture as a Joint Institution for the Federated Malay State and Straits Settlements.
[40]No. 2 in 1515/1917. Scheme for Malay Officers in the Department of Agriculture.
[41]No. 17 in 2199/16. Scheme for Employment of Malays in the Agriculture Department.
[42]Government, *Annual Report of the Secretary for Agriculture, SS and FMS* (1928), 13.
[43]D. H. Grist, *An Outline of Malayan Agriculture* (London: Crown Agents for the Colonies, 1950), 32–3.

It was important to establish an agricultural school that could provide training for the agricultural officers. As stated by D. H. Grist in his report:

> The question of the establishment of a School of Tropical Agriculture, based on the lines of the Ceylon school, is worthy of consideration. For the instructional work of this department it is essential that the Malay officers have a thorough knowledge of their subject. The training of such officers would be more thorough and be less likely to interfere with the normal duties of the scientific officers, if there was some central school where the necessary training would be imparted.[44]

The government wanted an educational institution that would emphasise research and instruction that could increase agricultural production, improve the condition of rural cultivation with modern methods, and support the agricultural industry. Among the proposals was the establishment of a Central School of Agriculture for training, both for natives destined for the DOA and for sons of wealthy Malays, landowners and other nationalities.

In 1927, an advisory committee was appointed by the government to outline a plan for a School of Agriculture that would be a joint institution with the FMS and SS. The committee recommended that the School provide adequate agricultural training for apprentices in the DOA and other departments where possible and for private students desiring to pursue a career in agriculture.[45]

The proposed institution was expected to have two degree plans.[46] A three-year degree prepared advanced students in the principles and practices of agriculture and exposed the student to scientific reasoning. This course was compulsory for the apprentices in the DOA but was also offered to other students. However, apprentices who were not Malay, especially Chinese and Eurasians, were strongly encouraged to enrol in this programme because the Chinese monopolised the smallholdings. Furthermore, it would stimulate competition among the Malays. The two-year course was a practical course that concentrated on rubber, coconuts, oil palm and other agricultural products suitable for estate cultivation in Malaya. This course was for students selected by the Technical Education Committee. It was intended that the students who completed this course would not work at the European-owned estates but at the Asiatic-owned estates and would earn higher wages than those who had not taken this course. The three-year course was more scientific and was primarily intended for government employees in the agricultural and other departments, while the two-year course was designed for the less educated. [47]

The major course, ie the two-year course, covered agricultural topics extensively. All students were required to have a scientific education before entering the school. The syllabus included chemistry and physics, botany and mycology, zoology, principles of agriculture, field crops, agricultural law, horticultural techniques, plant pathology, animal (including poultry) husbandry, genetics, estate sanitation and hygiene, estate records and reports, mathematics and surveying. These subjects were discussed in sequence, beginning with

[44]D. H. Grist, 'Upon Agricultural Education in Ceylon', 102.
[45]G. E. Mann, 'The School of Agriculture, Malaya', *Malayan Agricultural Journal* 27 (1939): 390–8.
[46]Advertisement for agricultural education in Malaya in the Malayan Agri-Horticultural Association Magazine. The advertisement explains that the school will be situated at the Government Experimental Plantation in Serdang, and will open in early 1930. It will provide two distinct courses of instruction: (1) a three-year course of a scientific nature suitable for Asiatic Officers of the DOA and possibly other government departments but open also to private students and (2) a two-year course, practical in nature, that would focus on the major crops of Malay and would be designed to train Asiatics in modern methods of estate management. Malayan Agri-Horticultural Association, Malayan Agri-Horticultural Association Magazine 1, no. 3, 1928.
[47]Mann, 'The School of Agriculture, Malaya', 390–8.

science, followed by agricultural science and scientific agriculture. The minor course, ie the one-year course, comprised nature study, animal study, principles of agriculture, field crops, arithmetic, agricultural geography, and office routine. The minor course was essential to local institutions because it primarily addressed crops and local needs.[48]

The first cohort of students graduated in April 1934 and the second cohort in April 1935. Almost all the Malays secured employment with the government. Nine were assigned to Selangor, Johor, Brunei and Kelantan; between eight and 11 entered the FMS agricultural services; and four were sent to the RRIM. Three Chinese graduates were assigned to government services in Penang, Johor and Sarawak and three to the private sector. Of the three Indian graduates, one found employment with the RRIM and two on estates. Malay assistant officers of the DOA usually worked in the field. They were appointed to advise, distribute seeds and pamphlets, and take charge of the demonstration plots established to show the cultivators the improvement that using up-to-date methods could produce.[49]

Conclusion

Education was an instrument of agricultural development and progress, especially for rubber cultivation, which contributed significantly to the economy of Malaya, and rice, the staple food of the locals. Though the development of training for agricultural officers was slow and the number of trained Malays was few, it appeared possible to devise a system that would ultimately prove of great value in educating the Malays and to establish a valuable link between the DOA and native cultivators.[50]

Science and technology encompass not only great projects or artefacts but knowledge and activities. If the complete diffusion of science and technology is to be achieved, it must involve the spread of activities and knowledge not only from one area to another but from one people to another. Education, schooling and learning constitute a major way in which colonial governments and enterprises taught basic skills through industry, public works, railroads, and particular trade school and apprenticeship programmes targeted towards the agricultural sector, as can be seen in this study. In the case of Malaya, the lowest level of technical education involved the training of children and local community members in the simple rural skills of farming and primitive crafts, a process that involved less literacy. [51]

By applying Basalla's model to the context of agricultural education, the vector can be identified as individuals who are involved directly or indirectly in the educational activity. These individuals were administrative officers, agricultural officers from the DOA or RRI, teachers in schools, or officials from organisations involved in the development of the agricultural sector. The spread of modern agricultural science was not only transmitted directly to the people but also indirectly through the distribution of leaflets and through visits and lectures to the villages such as those made by the rural lecture caravan. The purpose of such visits was to disseminate science to the local community members who were unable to pursue their studies in school. Such educational efforts also ensured that the villagers' standard of living would be enhanced through access to Western science.

[48]Ibid.
[49]William McLean, 'Education in Malaya', *Journal of Negro Education* 15, no. 3 (1946): 512.
[50]Grist, 'Upon Agricultural Education in Ceylon', C101.
[51]Daniel R. Headrick, *The Tentacles of Progress* (New York: Oxford University Press, 1988), 305.

The influence of village headmen and their assistants was also instrumental in the spread of Western science because they acted as dissemination agents of agricultural sciences. Their role is apparent in the specific agricultural courses they attended. Because the village headmen exerted considerable influence in the rural community, the British used village leaders to convince villagers that Western science was more practical and rational in the agricultural sector.

As for the knowledge taught to the locals, the focus was on modern and scientific farming methods, including the use of seed, fertilisers and the appropriate tools. Agricultural education focused on two crops: rubber, the main export, and rice, the staple food crop of the people. The Agricultural School opened its doors to local residents, becoming a mechanism for the dissemination of agricultural science in Malaya and a place where formal education was provided for residents, estate managers and trainers in research institutions.

The spread of Western science to the non-Western world was not as simple as Basalla's model suggests. The dissemination of science must take into account several factors, such as economic, social and political structures. This is reflected in the historical background of education in Malaya during British colonialism. The 'Divide and Rule' policy adopted by the British, for example, aimed to reduce conflicts among the local population[52] and was used by the colonial authorities to ensure continuous control over the territory and to maintain stability.[53] This policy was implemented through the education system: many English and Chinese schools were established in urban areas, and Tamil schools were established on the estates.

Different school systems were adopted by these communities to maintain community identity and secure the communities' political and economic interests. For example, Malays invested in agriculture, the Chinese in mining and commerce, and the Indians in rubber estates. These divisions reflect the existing historiography of education in Malaya and particularly the persistent theme that the British compartmentalised the Malays' role in the Malayan economy and society as farmers and fisherman.

As emphasised by the Deputy Director of the Broadcast School, 'it is a much better feeling to have grown the best bed of beans in the school garden than to be top of your class in arithmetic'. This quotation suggests that despite the 'developmentalist' orientation of the post-Second World War colonial state, not much had actually changed in colonial thinking and practice 'on the ground'. In fact, the political fragmentation experienced today is a significant legacy of the British colonial heritage, which divided and compartmentalised the population into ethnic groups and relegated them to specific roles in the economy.[54]

Agriculture was seen as a stable economic activity that would attract a settled population, lead to permanent colonisation and yield stable revenue. Realising this, the earliest British administrators attempted to encourage the cultivation of tropical products. The first generation of British officers also showed similar enthusiasm in encouraging agricultural activity. The unlimited forest lands that had not been explored appeared to be suitable for agricultural development. The British also predicted that the Malay States would be an ideal place from which to supply tropical agricultural products for both the British and European markets. As a result, the development of agriculture in the Malay States was an

[52]A. J. Christopher, '"Divide and Rule": The Impress of British Separation Policies', *Area* 20 (1988): 233–40.
[53]Richard Morroch, 'Heritage of Strife: Effects of Colonialist Divide and Rule Strategy Upon Colonized Peoples', *Science and Society* 37 (1973): 129–51.
[54]Christopher, '"Divide and Rule"', 233–40.

important objective of the colonial government,[55] which emphasised science as a tool of imperial control rather than a key to development.

The introduction of the Malayan Union aroused considerable opposition from the Malays and Malay rulers. To win the 'hearts and minds' of the locals, given the anti-insurgency campaign, the British conducted modernisation campaigns in Malaya through agriculture, especially rubber planting. However, this effort was opposed by private British investors because of the cost. Although there were conflicts between the British government and private investors, Guthrie was involved in the replanting efforts. Therefore, the transmission of Western science through agriculture continued in Malaya after 1945.[56]

According to Richard Easterlin, 'the whole world is not developed because the late arrival of mass primary education in less developed countries delayed the transfer of advanced technology from developed countries'.[57] Headrick stated, 'the reason the tropics experienced growth but little development under colonial rule is that investments went into physical not human capital and that the transfer of technology was more geographic than cultural'.[58]

Attitudes toward education were related to the characteristics of local societies and were shaped by the demands, goals and expected outcomes of the British administration. Administering a colony and increasing its production of self-sustaining and export commodities required new types of technologies and new forms of labour, which in turn required a basic level of technical education. However, this educational system did not just meet present needs but also prepared the younger generations for the future. It exposed the population to scientific education but, with the establishment of imperial domination over the colonial territories, local knowledge and skills were eclipsed; they were declared unscientific and denied encouragement and support by the colonialists. All of the knowledge and skills that the non-European cultures had accumulated over centuries of careful and selective observation and practice were disparaged and labelled unscientific.

Acknowledgments

The authors would like to thank the Humanities & Ethics Research Cluster, University of Malaya, for the research grant.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by a research grant from the Humanities and Ethics (H&E) Cluster, University of Malaya, Kuala Lumpur, Malaysia (project number: RP007B-13HNE).

[55]Lim Teck Ghee, *Peasants and Their Agricultural Economy in Colonial Malaya 1874–1941* (Kuala Lumpur: Oxford University Press, 1977), 14.
[56]Nicholas J. White, 'The Frustrations of Development: British Business and the Late-Colonial State in Malaya, 1945–57', *Journal of Southeast Asian Studies* 28, no.1 (1997), 103–19.
[57]Quoted in John R. Hanson, 'Education, Economy Development, and Technology Transfer: A Colonial Test', *Journal of Economic History* 49, no. 4 (1989): 939.
[58]Headrick, *The Tentacles of Progress*, 384.

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