The British Opium Monopoly, 1870-1900: Attempts to Induce Change in Production?

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Abstract

This essay aims to contribute to the discussion on the British Opium Monopoly by detailing top-down changes to the opium supply chain from the position of the Opium Monopoly. For its sources, it relies on the Reports on the Administration of the Opium Department from 1870 to 1900, including reports from the opium factories during this period. It argues that the monopoly’s security was not necessarily a given due to inconsistency in the annual quality of the opium produced, issues of branding, and issues of packaging.

I. Introduction

The aim of this essay is to detail and analyse elements of the British Opium Monopoly’s supply chain from seed selection to quality control and transportation. Much of the anglophone literature has analysed this monopoly through the axes of its relationship to the Indian peasantry and as the starting point for the trade with China, focusing on describing the structure of the monopoly rather than discussing attempts to induce change into the production process. However, the monopoly was both an export-orientated commercial business and a source of revenue to the colonial government, providing the impetus to innovate. It further suggests that tactics in addition to coercion, such as investing in irrigation infrastructure and writing off unrecoverable debts, though by no means turning the Opium Department (hereafter: ‘Department’) into a benign body, should be included in our understanding of its long-term aim for sustained output. Reports on the Opium Department from 1870 to 1900 are referenced to gain insight into its operations.
II. Sources

The reports referred to in this essay are letters from the head agents in the Bihar and Benares agencies to the board of revenue, their direct superior, and from assistants within the factories to the opium agents. Whilst they are not unproblematic, they do provide insight into the functioning and concerns of the monopoly. Most are formulaic in language, reporting activity and occurrences of concern, with only a few authors (e.g. W. Kemble) being outspoken about their views on the position and purpose of the monopoly. Data included are mostly consistent across reports. In some years an estimated value for the previous years is updated. In such a case, the updated value has been referenced whilst inconsistent data sets have been ignored. A significant issue with the data is its aggregation, usually at the district level rather than the lower kothi level. This is useful for broader trends but limits the possible granularity. As this essay is surveying longer-term changes within the Department, this is less of a problem, though one should remain aware that specific cultivators, land sown, and areas receiving loans may fluctuate within the data.

Bias in reported data should be expected and specific topics considered with care. Abuse from employees in the Department against cultivators did occur, and whilst these reports include statements of dismissals and suspensions for such actions, it is likely that such values are understated. Tables of legal cases related to the monopoly are useful reflections of what the authors concerns were and what they believed was significant, but should be considered a first impression and tested against judicial records in local archives before final judgements. However, these sources are still financial reports developed within a body whose raison-d’être was to increase income for the British Raj and control over production as far as possible, and therefore the records of their attempts are worth considering for understanding how the monopoly operated. Narratives within them must be approached with scepticism, but also provide ideas for future research and testing.

III. Structure and Limits of the Monopoly

The British opium monopoly has been understood primarily through the axes of its external trade and the monopoly-peasant relationship, both of which suggest it was a self-perpetuating system with little in the manner of internal change. Chaudhuri’s study captures this: production is understood through a debt-bondage system founded upon advances to cultivators, enforced by laws which punished peasants for not cultivating poppies after taking advances. Attempts to increase production (such as through changing the price offered) were responses to the
international market, with entering the contract assumed to be free.\(^1\) Richard has made the same assumption.\(^2\) Bakhala has criticised this focus on prices, arguing extra-market factors such as coercion should be considered in understanding the amount of cultivated land.\(^3\) In conjunction with reports of coercion by employees of the Department, a more convincing mechanism for decreasing and increasing the net land cultivated are superficially provided but not fully explored.\(^4\) Production cost estimates support the argument of coercion. The information available is less than ideal, predominantly one-off observations from persons either for or against the opium trade, but in taking the second lowest estimate for production costs Bauer has estimated that only in a good year could a peasant expect to pay off the advance, with pay too low to cover production costs and debt following shortly after.\(^5\) By an agent's own admission in the 1890s, tobacco and potatoes could earn three-times as much as opium for a cultivator after costs.\(^6\) An argument for coercion, enabled through the employment of local intermediaries, supported by various contemporary accounts, thus becomes understood as the mechanism for increasing production.\(^7\) Perverse incentives were also introduced, such as commission being paid to employees for contracting greater areas of land in the Bihar.\(^8\) Superficially, this lends support to a broader position within Indian agricultural history. Bose has suggested commercialisation of the production process of cash crops developed through a capitalistic state relying upon coercion to bring about commercialisation.\(^9\) The Opium Department, being a monopsony and a monopoly, is assumed to have had little reason to change given access to this mechanism.

However, that does not imply that the monopoly was without pressures to innovate. The first is within the context of revenue and expenditure. Sources of

\(^3\) Bakhala, Indian Opium and Sino-Indian Trade Relations 1801-1858 (School of Oriental and African Studies (University of London)), 1985): 122–23.
\(^4\) Bakhala, Indian Opium, 125.
\(^6\) Kemble, 30th November 1892, Printed in: Report on the Administration of the Opium Department During the Year 1893 (Hereafter: ‘RAOD’ followed by ‘year’) 1893, 5-6; Dunbar Blyth, 30th November 1898, RAOD 1899, 14.
\(^7\) Bauer, “Peasant Production,” 176.
\(^8\) Bauer, “Peasant Production,” 74, 76-77.
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revenue rarely changed, with new taxes being difficult to implement.\(^{10}\) Opium became the second largest source of income, capable of paying for the tea trade and a convenient tool for private traders remitting profits to Britain.\(^{11}\) Data collected by Richards suggests that it was a reliable source of revenue. It usually accounted for fifteen percent of income in the nineteenth century, with a high point of over twenty percent in the 1850s, decreasing in significance as other forms of trade emerged.\(^{12}\) However, expenditure was high and increasing. Spending doubled between 1871-72 and 1900-01 from 467 million rupees to 958 million rupees.\(^ {13}\) Waste-reduction measures can be expected.

Second, challenges from other opium suppliers and other merchants dealing in other crops appears to have been taken seriously. Malwa and Turkish opium traders in the 1820s were the first instance, with the East India Company giving up the high-cost, low-supply approach for low-cost, high-supply, reflected in the increase of net cultivated land.\(^ {14}\) Production was further increased in response to commercial information supplied by private traders and monopoly agents in China detailing the quality of Chinese opium.\(^ {15}\) Domestically, in the wake of continuous bad seasons in the 1890s, complaints are found in the reports of being unable to contract cultivators as sugar and indigo traders offered better terms, with the soil being exhausted from attempts to cultivate both indigo and poppies on it.\(^ {16}\)

Thirdly, whilst coercion was a significant factor, suggesting that it was the only element raises questions of the practicality of consistently enforcing it. First was the scale: there were 2,358 staff operating at the district level or lower for over one million cultivators.\(^ {17}\) When taken too far, the use of violence did result in backlash: in 1831-32 the East India Company yielded to local riots against coercion, riots against commercial ventures in Indigo resulted in the implosion of that Bengal industry, and


\(^{16}\) Mangles, 30th November 1880, RAOD 1881, 4-5.

\(^{17}\) Richards, “Peasant Production,” 71.
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local riots in Saran also occurred.\textsuperscript{18} Evidence of the use of the opium laws is surprisingly scant in the literature. Tables of legal cases from these reports are imperfect, since they likely understate cases pursued against cultivators or distract from non-legal means being used, as Bauer has suggested, to enforce cultivation. What they do suggest is that agents saw it necessary to report on conviction rates for smuggling. In 1880 Benares saw 766 of 855 cases result in a conviction for smuggling, with 13,198 rupees in fines.\textsuperscript{19} The Lower Provinces saw 370 of 440 cases result in conviction in 1889-90 and 465 of 573 in 1890-91.\textsuperscript{20} The harshness of a conviction is reflected in a defendant (it is not clear if this was a cultivator or smuggler) imprisoned for six months and fined 50 rupees for possession of 9.5 seers of opium.\textsuperscript{21}

![Figure 1: Net cultivated area (after failures) in the Bihar and Benares Agencies from 1803-04 to 1914-15 (bighas)](image)

Sources: Bakhala, “Indian Opium,” 109; Chaudhuri, “Commercial Agriculture,” 18, 20, 21; Bauer, “Peasant Production,” 325-326; and Reports on the Administration of the Opium Department for the years: 1872, 1875, 1899, 1900, 1906, 1908, 1918, 1922


\textsuperscript{19} Rivett-Carnac, 30\textsuperscript{th} November 1880, RAOD 1881, 56.

\textsuperscript{20} Inglis, 30\textsuperscript{th} January 1892, RAOD 1892, 9.

\textsuperscript{21} Rivett-Carnac, 10\textsuperscript{th} November / 1\textsuperscript{st} December 1891, RAOD 1892, 52.
New attempts to collect information on production and smuggling could also be cumbersome. A budget of 7,000 rupees per agency was introduced to pay for informers, but this quickly ran over budget and raised concerns of ‘professional informers’. Examples from Benares include 1877-78 with 16,940 rupees paid out and 1878-79 with 17,368 rupees paid out. Changes were made to not chase cultivators holding small amounts of opium and required the agent to sign off any pursuit through the judicial system. Debt-collection could also be flexible when needed. The norm was to collect all debts even if they were quite small. On occasion, the widespread inability to pay (due to crop-failure or an outbreak of cholera or malaria) was met with the writing off of debt. Examples include Bihar in 1871 where 18,000 rupees was written off (approximately 94 percent of debt) and 1880 with 44,635 rupees of 213,166 rupees. Benares saw lower amounts written off debt overall.

**IV. Irrigation Advances**

The Opium Department had every interest in making production more consistent, and the provision of capital for wells was a key element of this. Broadly speaking, irrigation investment throughout India was predominantly a private sector affair (with public investment accounting for forty-two percent of total investment) and geographically uneven, with the size of a region and accessibility as significant factors. Bihar and Bengal received less than nine percent of total irrigation investment from 1860-61 to 1897-98. However, opium poppies had to be watered on numerous occasions, prompting annual investment. Generally, such advances were only provided on the agreement to cultivate poppies and came with harsh legal repercussions. Some flexibility can be seen. In response to successive bad seasons in the 1890s and other crops rising in price the agent in Bihar reportedly advanced 49,535 rupees in loans in the hopes that cultivators would take up poppy production, acknowledging that the water would also be used for other crops. Members of the

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22 Gupta, 3rd February 1891, RAOD 1891, 28.
23 Macaulay, 28th February 1880, RAOD 1880, 5.
24 Kemble, 11th December 1890, RAOD 1891, 6.
25 Abercrombie, 28th December 1871, RAOD1872, 9; A. Forbes, 8th March 1881, RAOD 1881, 3.
29 Richards, “Peasant Production,” 74-75.
30 Kemble, 30th November 1892, RAOD 1893 6-7.
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Department also led construction projects, in one case 99,512 rupees were spent over seven years for the sake of improving irrigation facilities in the Siwan sub-agency, with 1,957 new masonry wells built and 344 repaired.\textsuperscript{31} Canals were tested, with one case in 1883-84 spending 3,945 rupees out of a budget of 10,000 rupees on creating canal shoots; but canals were expensive and limited geographically, while also allowing for fields to be turned into paddies, and for malaria mosquitoes to proliferate.\textsuperscript{32}

![Figure 2: Money advanced for well construction and repairs from 1869 to 1899-1900 (nominal rupees)](image)

Sources: Letters from the Bihar opium agent in Reports on the Administration of the Opium Department from 1872 to 1901: Abercrombie, 29th November 1873; Abercrombie, 8th December 1874; Rivett-Carnac, 5th January 1875; Alexander, 10th December 1875; Rivett-Carnac, 19th January 1876; Alexander, 6th January 1877; Mangles, 5th December 1877; Rivett-Carnac, 14th December 1877; Macaulay, 28th February 1880; Mangles, 30th November 1880; Forbes, 8th March 1881; Mangles, 28th November 1881; Rivett-Carnac, 28th November 1881; Mangles, 29th November 1882; Rivett-Carnac, 30th November 1882; Kemble, 14th December 1883; Rivett-Carnac, 29th November 1884; Kemble, 13th December 1884; Kemble, 21st November 1885; Rivett-Carnac, 30th November 1885; D’Ohyly, 30th November 1886; Rivett-Carnac, 29th November 1886; Gupta, 3rd Feb 1891; Kemble, 30th November 1891; Rivett-Carnac, 10th November / 1st December 1891; Kemble, 30th November 1892; Rivett-Carnac, 30th November 1892; Hopkins, 18th December 1893; Rivett-Carnac, 14th December 1893; Hopkins, 21st Dec 1894; Wright, 17th December 1895; Hopkins, 12th December 1895; Grierson, 30th November 1897; Wright, 30th November 1897; Levinge, 29th January 1898; Bonham-Carter, 31st January 1900; Stevenson-Moore, 16th February 1901.

\textsuperscript{31} Mangles, 27\textsuperscript{th} November 1879, RAOD 1880, 1-2.

\textsuperscript{32} Kemble, 13\textsuperscript{th} December 1884, RAOD 1885, 6-7; Blyth, 30\textsuperscript{th} November 1898, RAOD 1899, 12-13.

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The distribution of advances and wells constructed varied wildly from year to year, based upon demand for irrigation and the suitability of well construction. Bihar provides an incomplete dataset on the number of wells constructed and reflects the unevenness of the amount of land irrigated. Kutch (earthen) wells were more popular, being easier to construct but less durable than pucca (masonry). In Bihar, approximately twenty-six percent of poppy land north of the Ganges was irrigated, compared to ninety-two percent south of the Ganges.\(^{33}\) Areas with a lower ratio of land irrigated had the highest percentage of applicants and received the most, with the loans appearing unnecessary or too risky for areas with established irrigation.\(^{34}\) In Benares, the main recipients in 1884-85 were Ghazipur, Gorakhpur, and Aligarh.\(^{35}\) Gorakhpur continued to be one of the highest sources of applications for loans, with 32.17 percent of land still unirrigated in 1890-91.\(^{36}\) In 1893-94 this continued, with Gorakhpur receiving 5,759 rupees, Mirzapur 2,086 rupees, and Allahabad 1,588

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33 Alexander, 6\(^{th}\) January 1876, RAOD 1877, 12-13.
34 Rivett-Carnac, 10\(^{th}\) November / 1\(^{st}\) December 1891, 58.
35 Samuells, 6\(^{th}\) February 1886, RAOD 1886, 9.
36 Rivett-Carnac, 10\(^{th}\) November / 1\(^{st}\) December 1891, 58.
rupees out of a total of 11,176 rupees loaned out in that year. Furthermore, the nature of contents within the earth mattered: soil north of the Ganges was considered too alkaline (aside from Siwan), spoiling the well water and thus also the fields.

Table 1: Number of wells constructed in the Bihar agency from 1871-72 to 1899-1900

<table>
<thead>
<tr>
<th>Year</th>
<th>Pucca wells</th>
<th>Kutcha wells</th>
<th>Year</th>
<th>Pucca wells</th>
<th>Kutcha wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>1871-72</td>
<td>195</td>
<td>693</td>
<td>1886-87</td>
<td>301</td>
<td>578</td>
</tr>
<tr>
<td>1872-73</td>
<td>654</td>
<td>1,658</td>
<td>1887-88</td>
<td>237</td>
<td>237</td>
</tr>
<tr>
<td>1873-74</td>
<td>1,159</td>
<td>18,627</td>
<td>1888-89</td>
<td>263</td>
<td>306</td>
</tr>
<tr>
<td>1874-75</td>
<td>650</td>
<td>4,220</td>
<td>1889-90</td>
<td>507</td>
<td>4,033</td>
</tr>
<tr>
<td>1875-76</td>
<td>596</td>
<td>13,464</td>
<td>1890-91</td>
<td>125</td>
<td>316</td>
</tr>
<tr>
<td>1876-77</td>
<td>223</td>
<td>5,314</td>
<td>1891-92</td>
<td>353</td>
<td>143</td>
</tr>
<tr>
<td>1877-78</td>
<td>217</td>
<td>12,522</td>
<td>1892-93</td>
<td>471</td>
<td>671</td>
</tr>
<tr>
<td>1878-79</td>
<td>447</td>
<td>4,253</td>
<td>1893-94</td>
<td>394</td>
<td>3,943</td>
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<tr>
<td>1879-80</td>
<td>30</td>
<td>2,647</td>
<td>1894-95</td>
<td>238</td>
<td>17,429</td>
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<tr>
<td>1880-81</td>
<td>164</td>
<td>76</td>
<td>1895-96</td>
<td>794</td>
<td>3,943</td>
</tr>
<tr>
<td>1881-82</td>
<td>237</td>
<td>3,624</td>
<td>1896-97</td>
<td>471</td>
<td>17,429</td>
</tr>
<tr>
<td>1882-83</td>
<td>151</td>
<td>5,408</td>
<td>1897-98</td>
<td>338</td>
<td>561</td>
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<tr>
<td>1883-84</td>
<td>934</td>
<td>13,504</td>
<td>1898-99</td>
<td>170</td>
<td>2,103</td>
</tr>
<tr>
<td>1884-85</td>
<td>883</td>
<td>13,511</td>
<td>1899-1900</td>
<td>410</td>
<td></td>
</tr>
<tr>
<td>1885-86</td>
<td>527</td>
<td>4,810</td>
<td></td>
<td>Average</td>
<td>4,920</td>
</tr>
</tbody>
</table>

Sources: Letters from the Opium Agent in Bihar from 1871-72 to 1899-1900.

The demands of cultivating poppies created an incentive for the Department to make irrigation easier. However, as this worked through loans rather than direct investment, it was not without cost to cultivators. Other schemes to improve cultivation were also tested, such as advances for manure, but well advances were more practical and their impact over the longer term better known.

V. Branding, Experimentation, and Innovation

Quality control and branding were significant aspects of the trade, leading to innovations being adopted or rejected depending on whether they were cost-effective and whether they conflicted with the well-known qualities of the product. The ideal was to attain a 70:30 opium-moisture ratio for Patna and a 77:23 for Benares, above or below which the flavour, aroma, and colour of the opium cakes could change.

37 Walsh, 8th February 1896, RAOD 1896, 10.
38 Mangles, 30th November 1880, RAOD 1881, 5-6.
39 Grimley, 17th April 1877, RAOD 1877, 3.
40 Richards, “Peasant Production,” 70.
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This was reflected in the price system: the standard price referred to throughout the documents (usually 5 rupees after 1860-61) was offered for the highest quality whilst a graded system was in place for differing qualities.\(^{41}\) The simplest way to attain more high-quality opium was simply to produce more. However, quality distributions varied yearly and between districts (see figures 4 and 5), with category I opium being ideal, making this attainment of consistency a continual challenge. Compounding this, as payment for opium was provided by the seer of product delivered for weighing, there was incentive for adulteration to increase the bulk of the product, leading to annual complaints of adulteration. These ranged from poppy trash (a dust from ground poppy stalks and leaves) to dung and flour.\(^{42}\) Initial quality control was done with hand tests, relying upon the employee being able to judge consistency and detect contaminants.\(^{43}\) This made individual punishment difficult if it slipped through the initial search, with payments already made, but was cheaper than chemical tests.\(^{44}\) Iodine tests, present from the 1850s, were the most referenced, being capable of detecting starch and flour to gum and mucilage.\(^{45}\) Morphometry was cited as more accurate, but its use was minimal due to its cost and laborious nature.\(^{46}\)

Wastage reduction was a continual effort, with packaging and storage presenting challenges and opportunities, but their employment was limited by the perceived risk of change being too great. Opium cakes were wrapped in opium leaves before shipping, a long-standing practice that was argued to retain the flavour despite the fact that it offered limited protection against grubs and forms of fungus, such as yellow and black moulds.\(^{47}\) Between leakages and grubs at the Benares factory, 613 cakes were greatly damaged and 2,122 cakes slightly damaged in 1877-78, with 660 and 1,382 in 1878-79, and 308 and 757 in 1879-80, making them unsellable.\(^{48}\) A preference for this type of packaging, or at least the belief of a preference, is suggested from multiple sources throughout the nineteenth century: private companies such as Jardine Matheson being consulted before any such changes were

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\(^{43}\) Bauer, “Peasant Production,” 84.

\(^{44}\) Sheppard, 22nd November 1880, RAOD 1881, 33.

\(^{45}\) Eatwell, On the Poppy Cultivation, 17-18; Sheppard, 22nd November 1880, 32.

\(^{46}\) Eatwell, On the Poppy Cultivation, 17.

\(^{47}\) Abercrombie, 29th November 1872, RAOD 1893, 27; Mangles, 30th November 1880, ROAD 1881, 38.

\(^{48}\) Durant, 29th November 1880, RAOD 1881, 82.
Figure 4: Crude opium quantities
Source: P. A. Weir, 28th November 1882, RAOD 1883, 67

Figure 5: Average percentage of opium in crude opium received by the Benares opium factory in 1889-90 and 1890-91
Source: Rivett-Carnac, 10th November/ 1st December 1891, RAOD 1892, 48
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made,\(^{49}\) and experiments with using cheaper woods such as teak for chest construction raised concerns that the scent would give the impression of adulteration.\(^{50}\) Even by the 1890s, with changes to skins, papier-mâché and tins were considered too risky despite their sturdier attraction.\(^{51}\) Trials were still run, as with tea-lead to stop mildew (a thin white fungus), though unsuccessful.\(^{52}\) The one change that did succeed was the varnishing of cakes with oil.\(^{53}\) Overall, waste reduction in changes to the packaging was limited.

Within the factory, however, changes could and were implemented. Paying for better-quality cloth covers for pots prevented sand from adulterating the product and was implemented in the following year.\(^{54}\) Jars breaking was a recurrent issue, and trials to reduce losses were not new: leather bags and wooden boxes were trialled in 1831 and galvanised iron vessels in 1878, all failures. However, success was found in 1896-97 when the Shahabad district used cloth bags to both prevent opium from sticking to the sides of the jars (which was followed with laborious scraping), limited spillage if the jar broke and the bag could be moistened for easy removal, leading to it being trialed in a further seven districts to collect more data.\(^{55}\) Shortfalls in annual production provided an extra stimulus for experimentation. A trial was run to make use of crude opium with a high opium-moisture ratio, diluting it with water, which was found to be successful in attaining a suitable taste and aroma over the next two years.\(^{56}\)

The Department took the variability of output in terms of quality and quantity from poppies as a problem to be solved at the biological level. The vulnerabilities were numerous: excess heat or cold, ‘blight’ (fungal infection), insects, hail, excess water, drought, soil quality or lack of attention to this labour-intensive crop would reduce output.\(^{57}\) A part of this was tackled through the contracts signed with cultivators, making them cultivate a set amount of (usually the best quality) land.\(^{58}\) Experimentation with seeds local to a district in other soils, seeds from other districts or Malwa, and foreign seeds were trialled on a small scale across provinces to track

\(^{49}\) Bakhala, *Indian Opium*, 134.
\(^{50}\) Mangles, 5th December 1877, RAOD 1877, 49.
\(^{51}\) Kemble, 30th November 1891, RAOD 1892, 9.
\(^{52}\) Rivett-Carnac, 19th January 1876, RAOD 1876, 58.
\(^{53}\) Forbes, 1st February 1883, RAOD 1883, 13.
\(^{54}\) Carnac, 2nd December 1872, RAOD 1873, 51-52.
\(^{55}\) Grierson, 30th November 1897, RAOD 1898, 48.
\(^{56}\) Kemble, 30th November 1891, 19-20.
\(^{58}\) Bauer, “Peasant Production,” 80.
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relative output.⁵⁹ An 1877 report by the Curator of the Botanical Gardens captures the more scientific approach to this: some seventeen varieties of opium seeds were tested with different types of soil and water in experimental garden plots with the temperature levels and weather measured daily.⁶⁰ Difficulties for cultivators in purchasing manure prompted further experimentation with saltpetre, oil cakes, and lime with outputs tracked.⁶¹ A fertilizer called *shorah* was found to improve output by 5.45 seers per *bigha*, the attraction of which is obvious given the scale of production throughout the agencies, but excess application damaged the soil and thus prevented large-scale use.⁶² Overall, the Department appears to have been active in its support for research and trials to improve production figures.

VI. Cost-Cutting: The Opium Factories

Improving efficiency was a continual process in the opium factories, where chests were also constructed, driven by investment from agents into them and persons within the factories innovating. A stated aim was to reduce the cost per chest from 1 rupee 12 annas 5.5 pies to 0 rupees 13 annas 6.5 pies.⁶³ The running cost of the Patna factory in 1873 was estimated at 23,515 rupees (excluding the cost of timber).⁶⁴ Whilst not a perfect translation, the Benares agent estimated labour costs within the factories was 14,568 rupees per year.⁶⁵ This was reduced with the reduction of employee numbers (from administrative writers to daily labourers), use of the sawmill over manual labour and ending customary practices such as giving by-products to workers in favour of selling them (e.g. wood chips and saw dust), reducing costs from 23,566 rupees to 20,771 rupees.⁶⁶ In 1877 a reduction from 23,143 rupees to 16,535 rupees was met with the dismissal of three European workers (saving 800 rupees), extra supervisors for labour, and labour to carry jars.⁶⁷ The Patna factory appears to have had higher running costs (33,514 rupees in 1889-90) but also saw reductions to 22,425 rupees in 1890-91 to 19,384 rupees in 1891-92.⁶⁸

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⁵⁹ Carnac, 2⁴th December 1872, RAOD 1873, 39; Scott, *Experimental Culture of the Opium Poppy for the Season 1876-77*, Calcutta: Printed at the Bengal Secretariat Press, 1877, 7.
⁶³ Durant, 2⁵th November 1873, RAOD 1874, p.34-35.
⁶⁴ Durant, 2⁵th November 1873, p. 34.
⁶⁶ Durant, ⁸th November 1877, RAOD 1878, 47; Duncan, ⁴th December 1874, ROAD 1875, 32-33.
⁶⁷ Durant, ⁸th November 1877, 47, 51.
⁶⁸ Kemble, ³⁰th November 1892, RAOD 1893 20, 26.
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A variety of measures were taken to enact these reductions. Mechanisation was significant. One machine, which cost 500 rupees, reduced the number of files used per day from eleven to three, enabling a reported saving of 100 rupees per day on files and labour.69 This upgrading of facilities continued with the purchasing of hydraulic machinery to aid in the creation of opium cakes for internal sale.70 A more extreme example was 500 rupees being spent on creating seven machines inhouse which could replace most manual labour in the simpler tasks of chest construction.71 Replacing a previous contract system for carrying opium cakes with daily labour further saw a reduction from 374 rupees to 177 rupees.72 Even stamps for tracking cakes were halved in size to enact a reduction of 96 rupees 6 annas (74 rupees 1 anna from paper savings, 23 rupees 11 annas 8 pies from wages to clerks).73 A ‘school’ was established to train cake-pressers in the hopes of reducing waste.74 Facilities were also reused, such as the alkaloid extraction facility being placed for sale on the London market and to pharmaceutical companies.75

There were incentives for individuals to innovate. Individual prestige was one, with commendations recommended by the head agent in annual reports. Money was another factor: Girling, an engineer in the Patna factory, was rewarded with 1,000 rupees for the construction of machines to drill holes into planks for building chests and the cutting of wood to make their internal compartments.76

Obtaining enough timber for chest construction also led to experimentations with new types of wood and cost-cutting. The cost of timber was a significant element of factory production, at 49,361 rupees in 1874, beyond the 23,566 rupees for operating the mill, and most was obtained on contract from private companies (in 1883-84 companies including Messrs, Dear & Co. and Jadu Rai provided their highest quality wood at 1 rupee 8 annas per cubic foot).77 Sāl and kurma had been used but were becoming increasingly expensive and could not be acquired in sufficient quantities. Experiments for viable alternatives were small-scale and common: in 1871 approximately ten logs of sidh and bahera wood were purchased and were kept for a year under cover, the former being trialled again whilst the latter had rotted, with

69 Durant, 25th November 1873, RAOD 1874, 30.
70 Rivett-Carnac, 10th November / 1st December 1891, RAOD 1892, 65.
71 Kemble, 27th November 1888, RAOD 1889, 10-11.
72 Sheppard, 22nd November 1880, 29.
73 Sheppard, 22nd November 1880, 35.
74 Sheppard, 29th November 1882, RAOD 1883, 36.
75 Carnac, 29th November 1886, RAOD 1887, 46.
76 Forbes, 6th March 1881, 6.
77 Duncan, 4th December 1874, 31; Kemble, 13th December 1884, RAOD 1885, p. 11.
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saul, cedar, and mango trialled the following year in a similar selection-by-
elimination scheme. 78 Such experimentation, promoted by shortages of timber,
eventually resulted in switching to mango wood for all internal chest construction,
found to be the cheapest and most reliable source available.

Despite chests bought on contract being cheaper, inhouse production was
continued to meet production targets. In 1874 mango chests could be bought for 1
rupee 12 annas each and in 1878-79 chests were bought for 1 rupee 15 annas
(excluding cost of transport to the factory, though still considered more economical
in earlier years). 79 Producing a chest in the Patna factory in 1877-78 cost 3 rupees 15
annas 4.5 pies per chest, declining only slightly to 3 rupees 13 annas 3 pies per chest
in 1878-79. 80 However, late deliveries resulted in shortfalls, prompting inhouse
production to meet export requirements. 81 By 1889-90 inhouse production cost less,
reported at 15 annas 3 pies, whilst mango chests on the market cost 2 rupees 14 annas
10 pies for purchase and postage. 82 This reduction was driven by the switch to mango
wood, with constructing a sāl chest estimated to cost 1 rupee 8 annas whilst mango
cost 8 annas, estimated to have saved 35,937 rupees per year. 83

VII. Conclusion

This essay has sought to contribute to the discussion of the production of
opium in India by detailing top-down changes into the supply chain from the point of
seed selection and irrigation to processing within the opium factories. Previous
literature, for good reason, has focused first on relations between peasant cultivators
and the Department and second on the nature of the export trade to China and
Southeast Asia.

The Department attempted to introduce numerous changes into the
production of opium, from commissioning research into seed selection to irrigation
infrastructure and cost-cutting measures within the factories. That these approaches
were used does not deny the role of coercion in developing the trade but instead
indicates that other areas are also worth interrogating for developments in the
production process. Two sources of pressure to change came from the reliability of
opium as a revenue source in the face of increasing costs, and the export-orientated
nature of the monopoly which demanded a relatively uniform product in the face of

78 Durant, 13th November 1872, RAOD 1873, 19; Durant, 25th November 1873, RAOD 1874, 29.
79 Duncan, 4th December 1874, RAOD 1875, p.33; Durant, 15th November 1879, RAOD 1880, 82.
80 Macaulay, 28th February 1880, RAOD 1880, 3.
81 Durant, 15th November 1879, 82.
82 Kemble, 30th November 1891, RAOD 1892, 20-21.
83 Inglis, 1st February 1893, RAOD 1877, 10.
its natural variation and ease of spoiling. Being a monopoly was not enough to avoid change.

Going forward, a search for accounts by Indian workers within the Department would provide greater insight to other aspects of the supply chain. The Reports on the Administration of the Opium Department reflect many of the debates, concerns, and strategies (both the successful and the failures) held by the chief agents but bring with them a colonist-centric bias. Data allowing, how Indian employees reacted to and considered top-down changes has implications for their cost and reach: were there attempts to impede change to the supply chain, such as the introduction of mechanised systems within the factories? Searching for more granular data would draw out local trends in production and the ways in which the opium laws were applied.

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