



Review Paper

## Technological improvements in agricultural implements and their impact in colonial Punjab, India

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### Abstract

*Technological progress has defined the social conditions and has caused civilizations to evolve and progress. Technology in agriculture has been the hallmark of ancient as well as modern civilizations. Agriculture has been the main occupation of the overwhelming majority of population in Punjab since ancient times and it defined the economy of the rulers. In Colonial Punjab too, agriculture continued to be the mainstay of the government income. Therefore, it became one of the main areas which determined the policies of the British. This was also because the economic transformation of the province depended on the dissection and form of agricultural change. At the outset of British rule in Punjab, the agricultural implements in use were medieval in nature with not much technological changes from the Mughal period and the Sikh rule. The establishment of British rule in Punjab opened the way for the introduction of western Science and Technology in the province. Various technological improvements were introduced in agriculture which lead to new techniques of cultivation, irrigation, reaping and harvesting and as such more efficient equipments and machines. Technological changes in the agricultural implements brought about significant changes in the social and economic set up in the province and their impact was generally positive and long lasting. This paper discusses the technological improvements in agricultural implements under the British regime in Punjab during 1849 to 1947.*

**Keywords:** Technology, Agriculture, Colonial Punjab, Impact, Modernization, Implements.

### Introduction

Punjab was annexed by the British on 29<sup>th</sup> March, 1849 and it was the last province in India to come under the colonial rule. The advent of the British gave a new dimension to the history of Punjab. The task of development through Science and Technology was cut out for the colonial regime as they aspired to get economic gains from the agriculture sector. Therefore, the colonial masters took up technological interventions, mainly targeting the agricultural and irrigation sectors as these sectors dominated the rural economy and additionally, such measures could also bring political stability in the province to consolidate their rule. The British concentrated on agricultural frontier as agriculture was the main occupation of the overwhelming majority of population as well as the mainstay of the government income in the Punjab. Therefore, it was identified as a priority area which could determine the policies of the British. To increase the agricultural output and food grains, research on new methods of cultivation, introduction of new and improved varieties of crops and technological changes in irrigation techniques and agricultural implements was required. The British Government responded to these immediately and within a short duration of time, drastic changes were witnessed in agricultural sphere. Since the agricultural implements in use in Punjab were of medieval times, technological improvements

in agricultural implements were introduced in the province on priority basis by the British regime.

### Discussions

Agricultural development was the priority of the British regime when they took up the reigns in Punjab. One of the notable features of British policy was that they paid special attention towards the process of introducing technological innovations in the agriculture of the Punjab. Immediately after annexation, the British Government encouraged the growth of commercial and marketing spirit in agriculture by introducing new implements and improved seeds<sup>1</sup>. Agricultural policy was drafted for Punjab and an important component of this policy was to conduct research for improving agriculture. The beginning was made in 1851 by the setting up of Punjab Agri-Horticultural Society in Punjab.

Henry Lawrence became the first President of the society and majority of Europeans were enrolled as its members. The society remained in force for twenty year period (1851-71) during which it attempted to advance the agriculture, floriculture and horticulture of Punjab. Although the society failed to achieve its full objectives, yet it gave a distinct direction for policies to be adopted for the development of agriculture in the province on modern scientific lines<sup>2</sup>.

In the year 1906, Department of Agriculture was structured under a Director of Agriculture with the objective of implementing agricultural research in agricultural operations. Initially, its headquarter was located at Lyallpur<sup>3</sup>. The department was separated from that of Land Record with effect from 1 July 1906. The task of the Agricultural Department was to provide extension services at its experimental farms at Lyallpur, Sargodha, Montgomery and Jullundur etc. and to explain and demonstrate the results of research carried out by them. There was a visible shift towards a more modern approach to agriculture as latest implements were incorporated in agricultural procedures. The increasing manufacture of the iron implements and their assimilation led to the mechanization of agriculture in the Punjab.

### Improvement and modification in implements

The efforts to introduce the new implements in the province were initiated in the late 19<sup>th</sup> century. However, with the formation of the Department of Agriculture in 1906, more attention was paid to the evolution of new implements. The colonial Government began the task of modification in agricultural implements by popularizing the improved implements among the farmers through Village Farmers' Associations, which were organized in 1911-12<sup>4</sup>.

Use of iron was preferred by the new regime and manufacture of the iron implements was increased. Their assimilation led to the mechanization of agriculture in the Punjab and there was a visible shift towards a more modern approach to agriculture as latest implements were incorporated in agricultural procedures. The more important among the iron implements were ploughs, horse and hand hoes, harrows, drills, reapers, threshers, winnowers, fodder cutters, cane crushers and Persian wheels<sup>5</sup>. This approach was wide-ranging as the introduction of modern and latest implements yielded good results leading to better agricultural output.

The attention given to development and introduction of more effective farming implements was helpful in two ways. Firstly, the modern implements and machinery which was in use in the world market, was modified to suit local conditions. Secondly, improvements were made in indigenous implements<sup>6</sup>.

The basic set of agricultural implements, however, changed little during the British rule. There was a tendency towards the use of more iron in place of wood which led to better quality irrigation equipment and better ploughs in some areas. In the early twentieth century, agricultural scientists and economists started advocating a heavy plough and deep ploughing for dry areas. This policy also encouraged the farmers to use more number of iron ploughs<sup>7</sup>. Most of the agricultural implements used by the farmers were cheap, light and portable, easy to make and to repair, and within the capacity of drought cattle. There was, however, great scope for improvement. To popularize modern implements, the department of agriculture

instituted agricultural machinery depots which stocked new implements and spare parts recommended by the department<sup>8</sup>.

The details of new agricultural implements introduced, modified and improved in Punjab by the Colonial Government are as under:

**Sugarcane Crushers:** Sugarcane crushing in Punjab was carried out using a native press called *Velna*. The colonial government recommended new iron sugarcane crushers, supplied by Messers Thomas and Nylne Behila Company, which swiftly superseded the previously used crushers<sup>9</sup>. The new crusher was more sophisticated and required only one pair of bullocks to work instead of three pairs. It simplified, cheapened and facilitated the work of pressing sugarcane 13 times more and the quantity and its yield was 20 percent higher than the old press<sup>10</sup>. Although it was introduced in the last quarter of the 19<sup>th</sup> century, yet it outclassed the old wooden press everywhere in the province. There were other improved locally made crushers built by Nahn Sultan Mills and Batala Mills. Various power driven mills were also introduced of which Chattanooga No. 192 and Messey proved popular. Both of them required the driving power from 10-15 HP and crushed 25 to 30 maunds of cane per hour. These were quickly and readily adopted by many farmers with very encouraging response<sup>11</sup>.

**Motor Tractors and Drills:** The Department of Agriculture after conducting many trials with the motor tractors in Punjab, introduced them and owing to their centrality in agricultural work, they received particular attention. However, the initial trials did not prove to be highly successful. In 1920 two motor tractors, an Auston and a Cletrac, were purchased. But these were also not very successful due to frequent breakdowns<sup>12</sup>. Among other agricultural implements, experiments were also conducted on drills. Various types of drills were introduced for sowing the seed in two or more lines at a time. The imported automatic drills were tried for sowing wheat and cotton, but all of these were complicated and more expensive. For this reason, the Agricultural Department decided to evolve a number of simple drills such as *Kharif* and *Rabi* drills. In 1923, an automatic *Rabi* drill was evolved at Lyallpur and it immediately found acceptance with the landowners and farmers because of the fineness of its work<sup>13</sup>.

**Reaping Machines:** Two types of reaping machines, manual delivery and self-delivery, were introduced in the province. The first bullock power reaper cutting standing wheat, barley and oats was obtained at Lyallpur farm in 1906. But it never became popular with the farmers. During 1907, seven reaping machines were employed in the two canal colonies for demonstration and about 20 machines were imported in the province<sup>14</sup>. In 1909, about 42 reapers were used in the province and this number rose to 150 in 1915<sup>15</sup>. The newly introduced reapers revolutionized agriculture, reduced reaping time and received a positive response from the agriculturists. With the improved reaper,

some *Zamindars (cultivators)* cut as much as 8 to 10 acres in a day. The cost of reaping an acre of wheat was about Rs. 18, whereas by the new reaper, the cost was reduced to Rs. 7-8. Thus the utility of the reapers was valued<sup>16</sup>.

**Persian Wheel:** The colonial engineers also designed an improved Persian wheel. The Agri-horticultural Society had its working model in operation at Lahore by December 1851. The wheel worked well and increased the water flow. It required less human and cattle labour. The Agriculture Department evolved several other types of improved Persian wheels to lift ground water<sup>17</sup>. Technologically, a cheap form of metal roller bearing was introduced in the improved Persian Wheel which was worked by animals. The new iron Persian wheel was much liked by the farmers<sup>18</sup>.

**Ploughs and Hoes:** Two types of improved ploughs were introduced – one having a short beam and the other with a long beam. The important ploughs with short beam and a land wheel were Raja, Punjab and Chattanooga. But due to their high price, complicated method of regulatory mechanism and difficulty in their repairs, they never became popular in the province<sup>19</sup>. The second type of ploughs with long beam and without wheel was called *munah* plough. Bullocks were yoked to them and they were easily controlled by the ploughman and became popular in Punjab. They could be further divided into two classes – heavy and light. The light plough was suitable for light lands using small bullocks and was known as *Meston* plough. Innovations like use of iron in ploughs facilitated cultivation in novel ways. The new iron ploughs which were recommended to the farmers were helpful in bringing the lower layers of the soil up and taking the top portion down, thus improving the working of furrow turning ploughs. This was not possible in the case of indigenous ploughs<sup>20</sup>.

This type of plough received an overall positive response from the cultivators. By 1909, over 200 light furrow turning ploughs were sold in the province, which is indicative of an affirmative response to the British policy of making agriculture scientific and mechanized<sup>21</sup>. The hoes and harrows of various sorts were implements intended for stirring the soil after first ploughing. They had several teeth fixed below some kind of frame and used for breaking the surface after rain, covering small seed after sowing and inter-culturing the crops<sup>22</sup>. Various kinds of horse, bullock and hand hoes were recommended to the cultivators. Among the imported hoes, the international planet junior horse hoe, made from American machinery, resulted in a good economy in making ridges for cultivation of vegetables, sugarcane and cotton. Seventeen hoes of this type were ordered by the agricultural department for private persons in 1908<sup>23</sup>. The sale of different makes of imported horse and hand hoes numbered 50 in 1922-23 which rose to 310. But as they were costly, a cheap bullock hoe was introduced<sup>24</sup>. Similarly Lyallpur hoe was introduced in 1916. The Lyallpur and Gujrat hoes became popular among the agriculturists. Among the harrows, the spring lined harrow proved very useful as it enabled the

farmers to make better use of rainfall or irrigation water. A simple and cheap bar harrow designed by Department of Agriculture was evolved in 1914. In the same year, the department started manufacture of simple improved country made implements at Lyallpur Agricultural farm. The response was so positive that this work was also started at the other experimental farms of the department. In 1915, when the agricultural engineer was appointed, further work on the adoption of modern implements was taken up. Some additional useful work like introduction of several types of improved implements like furrow-turning fodder cutters, harrows, hoes and small pumping machinery was also carried out by the Department of Agriculture<sup>25</sup>. These implements were found suitable for local conditions and were brought on the approved list of the Agricultural Department<sup>26</sup>.

## Conclusion

The technological improvements in agricultural implements under the British Government met with good response from the local farmers of Punjab, who responded positively to the reformative zeal of the British policies which were aimed at introducing new implements from abroad and their modification in accordance with the suggestions from the agricultural department and as per local requirements.

The contribution of the British policies and their implementation was most apparent in the enrichment of agricultural implements. Implements imported from Europe were tailored according to indigenous realities. The sturdy farmers of the province were quick to adopt the new and modified/ improved implements and thus the overall response of the local cultivators to these improvements was that of acceptance and endorsement. The modified ploughs, fodder cutters, harrows, hoes and reaping machines contributed a lot in improving the crop yield and making agriculture less time and energy consuming and more profitable. Thus, the technological improvements in agricultural implements contributed immensely to the modernization of agriculture in Punjab, making it in turn the most agriculturally advanced province in the Raj.

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