Lumian No. 1 and the Science of Cotton Improvement

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（８）选育“鲁棉一号”良种的主持人庞居勤同志。
他最近被提为山东省棉花研究所所长。　李　锦摄

While sifting through materials at the Shandong Provincial Archives during the fall of 2019 (funded by the OYCF-Chow Fieldwork Fellowship), I came across an interesting document regarding the breeding of a variety of cotton known as Lumian No. 1 (鲁棉一号, hereafter LM1). LM1 was a very important variety developed by cotton scientists at the Cotton Research Center of the Shandong Academy of Agricultural Sciences from 1961 to 1976. It won a First Class Invention Award (国家一等发明奖) in 1981 and was one of the most widely grown variety of cotton in China during the early 1980s. The archival document I found was from 1981 and dealt with how to distribute the ten-thousand-yuan cash prize associated with the award. Given that the breeding of a new variety such as this was a time-consuming process that involved the assistance of many individuals, a handful of reports and inquiries were produced to determine how to properly distribute the money. Should the full amount go to Pang Juqin 庞居勤 (image above), the lead scientist on the project? Or should it be distributed, based on their contributions, to the multiple individuals involved in the project?

To answer these questions, a multi-page document was produced tracing the history of how the variety was developed, tested, and distributed from 1961 to 1980. The document listed no fewer than fifteen individuals who contributed countless hours of work to breed LM1. Given its complexity and the many individuals involved, they determined to distribute the money between the fifteen scientists based on their individual contributions. The largest sum went to Pang for his ten years of work in breeding the variety along with his dedication in “overcoming hardships” and ensuring that the work wasn’t interrupted during the “chaos of the Cultural Revolution.”[1]

More interesting than how the funds were distributed, however, is what these documents reveal about the complicated history of seeds and science in twentieth century China. While

[1] “Guanyu baosong Lumian yihao faming jiangjin fenpei yijian de baogao” 关于报送鲁棉一号发明奖金分配意见的报告, 1981, A052-03-131, Shandong Provincial Archives, Jinan.

short and conscience, the descriptions nevertheless show how LM1 constituted a compressed accumulation of numerous biological, environmental, cultural, political, and social factors, many of which predate the 1960s and 1970s. Before the 1960s, cotton breeding in China was primarily conducted by carefully "selecting" the best performing plants from a field for multiple years until relative uniformity was achieved. In 1961, scientists in Shandong decided to use this method alongside hybridization, or the crossing of two different varieties in an attempt to create an offspring with desired characteristics from both parents. Hybridization of cotton wasn't widespread in China at the time due to its relative instability from generation to generation. However, in the aftermath of the Great Leap Forward, scientists in Shandong experimented with crossing different varieties of cotton, including two varieties known as 1195 and CRI2 (中棉所 2 号). The pedigree of these two varieties dates back even further than 1961 as both 1195 and CI2 were selected from Deltapine 15, a variety of cotton that was smuggled out of the United States and brought to the People's Republic of China in 1950. Deltapine 15 in turn has its own complicated ancestry, developed by the U.S. agribusiness company Delta & Pine Land Company in Mississippi from varieties that were brought to the U.S. from Central America in the late nineteenth and early twentieth centuries.[2]

For the following nine years after 1961, scientists continued using selection as a method to isolate and propagate desired characteristics. The Cultural Revolution made this work more difficult as the Cotton Research Center in Shandong was closed and many scientists were denounced, criticized, and forced to join production teams and undergo labor reform. Yet research continued. In 1971, Pang suggested using radiation breeding, or the use of atomic rays (in this case, gamma rays) to improve and stabilize the hybrid. Knowing that the first generation of radiation breeding is often poor and highly unstable, Pang and his colleagues planted the seeds in an obscure location south of their pig farm to avoid criticism. By selecting the best plants over the next few years, the scientists eventually developed a stable and high-yielding strain that they named Lumian No. 1 in 1976.[3]

Despite any hardships that scientists such as Pang faced during the Cultural Revolution, their accumulative efforts led to scientific advancements that helped fuel the early years of the post-reform rural economy.[4] Following a decade of experimentation, the scientists began distributing the variety for regional tests. Thirteen test plots in Shandong found that yields from LM1 were over 60 percent higher than other varieties grown locally while twenty plots located along the Yellow River basin recorded a 40 percent increase in output. Following these tests, the seeds were widely distributed and within a few years, the amount of LM1 grown in China increased from only 1 mu in 1975 to over 18 million mu by 1981 – the fastest spread of any locally-bred cotton variety up to that point. By the mid-1980s, this number had increased to

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[2] Zhongguo nongye kexue yuan mianhua yanjiu suo 中国农业科学院棉花研究所主编, ed., *Zhongguo mianhua pinzhong zhi* 中国棉花品种志 (Beijing: Nongye chuban she, 1981).

[3] "Wei min zaofu, wei guo zhengguang —— sheng mianhua yanjiu suo xuanyu Lumian yihao qianhou" 为民造福 为国争光——省棉花研究所选育鲁棉一号前后, *Dazhong ribao,* May 17, 1981.

[4] On agricultural science in Maoist China and the legacies of Mao-era science, see Sigrid Schmalzer, *Red Revolution, Green Revolution: Scientific Farming in Socialist China* (Chicago: University of Chicago Press, 2016); Sigrid Schmalzer, "Layer upon Layer: Mao-Era History and the Construction of China's Agricultural Heritage," *East Asian Science, Technology and Society* 13, no. 3 (2019): 413-441.

nearly 25 million mu, constituting nearly 60 percent of cotton grown in Shandong or roughly 30 percent of all cotton grown in China.[5]

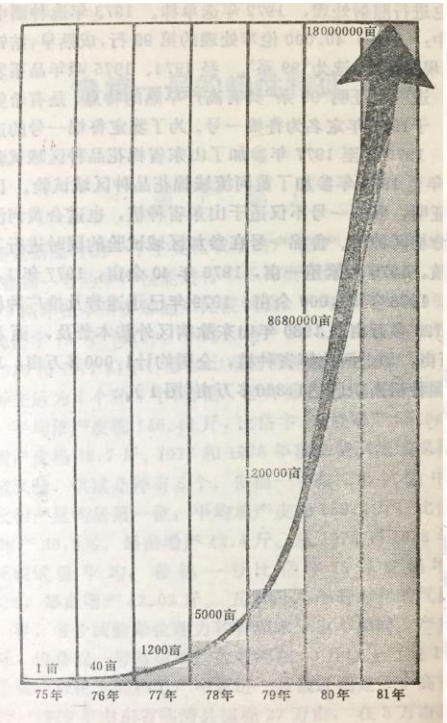

图 1 鲁棉一号历年种植面积

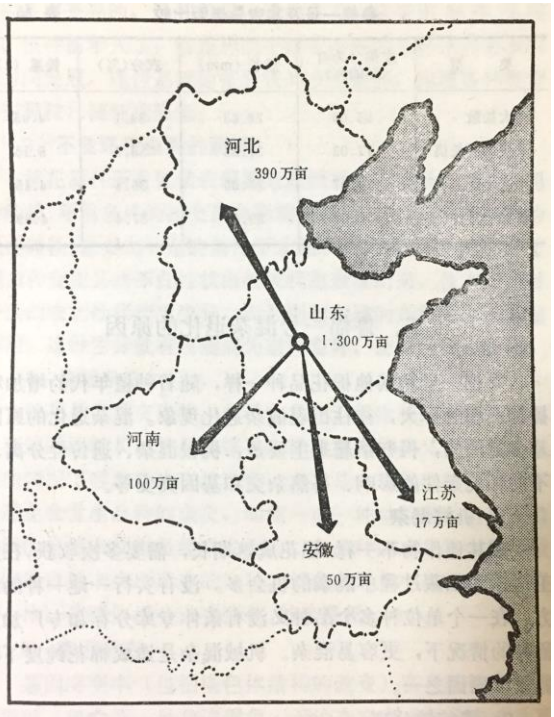

图 8 1981 年鲁棉一号在部分省种植面积

The quality of LM1, combined with its rapid diffusion, led to it winning the First Class Invention Award in 1981. While the significance of LM1 began to decline in the late 1980s as it was replaced by newer varieties, publications during this time placed the achievement of LM1 alongside the development of hybrid rice.[6] Moreover, it generated a lot of excitement within the cotton science community and elevated the status of the Cotton Research Center. Nearly 40 years later, one cotton scientist recalled with clarity the excitement he felt when joining the center in 1980 and the strong sense of pride and satisfaction that LM1 brought to these scientists.[7] In the fall of 2019, I found that farmers in rural Hebei still remembered receiving and growing LM1 seeds. Since the 1980s, there has been a dramatic increase in the number of cotton varieties developed and distributed throughout China. Extension data compiled in 1980 only lists 19 cotton varieties in distribution, with LM1 being the most widely distributed variety. By the 1990s and into the 2000s, the number of different varieties in circulation each year increased to well

[5] "Lumian yihao yanjiu faming dashiji" 鲁棉一号研究发明大事记 (p. 99-102), 1981, A052-03-131, Shandong Provincial Archives; "Mianhua da fengshou kexue jishu qile guanjian zuoyong" 棉花大丰收科学技术起了关键作用 (pp. 57-70), c. 1981, A052-03-132, Shandong Provincial Archives; Quanguo nongye jishu tuiguang fuwu zhongxin 全国农业技术推广服务中心, *Quanguo nongzuowu zhuyao pinzhong tuiguang qingkuang tongji biao* 全国农作物主要品种推广情况统计表 (published annually from 1980-present); Shandong sheng mianhua yanjiu suo 山东省棉花研究所, *Lumian yihao* 鲁棉一号 (Beijing: Kexue puji chuban she, 1983).

[6] "杂交水稻和鲁棉一号的成就说明了什么？" *Renmin ribao* May 6, 1981.

[7] Interview with Li Ruzhong, December 19, 2019.

over a hundred.[8] Given this increased number of seeds in circulation, it seems unlikely that a single variety of cotton will be as widely distributed again as LM1 in the early 1980s.

On the surface, a seed such as LM1 appears to just be the result of a biological process. But the reality is that seeds are much more complicated. A seed, according to Francesca Bray, "both encapsulates and masks the accumulation of human and natural events that produced it."[9] Some of these forces are the product of deep history while others are more recent. The life of a seed, both distant and recent, can be difficult to trace. The documentation produced in the early 1980s on LM1 held at the Shandong Provincial Archives provides a relatively rare window into the complicated natural and human events surrounding its creation. Unmasking the events that produced LM1 are insightful not only for what it can tell us about the seed itself, but also for what it reveals about the complicated social, political, cultural, and scientific environment in which it was produced.

[8] Quanguo nongye jishu tuiguang fuwu zhongxin 全国农业技术推广服务中心, *Quanguo nongzuowu zhuyao pinzhong tuiguang qingkuang tongji biao* 全国农作物主要品种推广情况统计表 (published annually from 1980-present).

[9] Francesca Bray, Review of Fullilove, Courtney, *The Profit of the Earth: The Global Seeds of American Agriculture*. H-Sci-Med-Tech, H-Net Reviews. April, 2018. URL: http://www.h-net.org/reviews/showrev.php?id=49933