

Contribution of scientific innovation and environmental friendly strategies on the development of Chinese tea industry

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I have chosen as my topic for the International ICOS to look at how the impact of scientific innovation on the development of Chinese tea industry in new century.

I. Situation

Over the past 60 years the Chinese tea industry has been very successful in the development of tea production. The total acreage of tea plantation increased from 169,400 ha in 1950 to 1,866,600 ha in 2009, 10 times up. The total production grew from 62,000 t in 1950 to 1,350,000 t in 2009, 20.7 times higher. The exporting amounts increased from 18,700 t to 304,000 t, 15.2 times higher. The annual increase was 5.93% during 1950-1970, and the annual increment in the period of 1971-2000 was 13.4%, and the annual increment in the period of 2000-2009 was 10.8%. The significant higher increasing rate during 1971-2009 could be mainly attributed to the support of the achievements in the tea science and technology.

II. Scientific Innovation and environmental friendly strategies

I have chosen the following examples to illustrate the impact of science and technology on tea production.

1. Role of cultivars

The wide spreading of new cultivars increased the yield per unit area significantly in China tea production. There are 97 National fine tea cultivars registered by the National Tea Cultivar Evaluation Committee. The Longjing 43 tea cultivar could be an example. Longjing 43 is selected from the Longjing population in Seventies of last Century and was evaluated as a National fine green tea cultivar. It is characterized by early-sprouting and high quality. By wide spreading this early-sprouting cultivar, the plucking time could be 20 days earlier than the traditional cultivars, thus making a higher economic efficiency. The planting acreage of this cultivar occupied more than 30% of the total acreage of clone cultivars in this area.

The other example on the roles of cultivars is a new cultivar named Anji White tea. It is characterized by the extra-high amino acid contents and unique leaf color, whose tender leaf with light green color in leaf-vein area and yellowish color in the remainder area. The green tea product manufactured by this cultivar in the early spring season is characterized by freshness and mellowness taste due to its high amino acid content. Research showed it is a temperature-sensitive mutant. The yellow-greenish shoot will turned to green color when the temperature is higher than 25 °C. So, it is only a short time (20-30 days) could to produce this famous tea. The price of this green tea is around 2-3 times higher than the other spring green tea products. The income from Anji White Tea in the Anji County area is around 300 million Yuan RMB in 20 days period.

2. Development of premium tea product

Premium tea is the product manufactured by the single bud or one bud and one leaf shoot and with high quality and aroma. This kind of tea was developed since the beginning of 1990's instead of the low quality tea product. It is an emergency strategy to the overstocking of low quality tea in the end of 1980's. The production of premium tea was increased continuously during the recent twenty years. The output value of premium tea was much higher than that of ordinary tea products. This strategy remedies the declining tea industry in the end of Eighties of last Century. In 2009, the production of premium tea occupied nearly 40% of the total China tea production, however, the output value contributed as high as 80% of the total tea production.

3. No-pollution control of tea pests

Tea pests caused 10-20% decrease of yield annually in China tea production. The application of chemical pesticides remedy the losses caused by the damage of pests, however, it also induces the problem of pesticide residue, resurgence of pests and the resistance of pests on the pesticide. For the guarantee of the food safety, the Maximum Residue Limit (MRL) of pesticide in tea was set up in more and more strict standard in the tea importing countries since 1999. Since then, the non-pollution pest control was put forward by the Ministry of Agriculture of China Government to the tea industry.

The chemical communication between tea plants-insect pests-natural enemies was investigated in China since the beginning of new Century. Results indicated that volatiles emitted from tea shoot played a major role in attracting the insect pests. After damaging, the metabolism in tea plant is changed, and emits the different and specific volatiles to attract the natural enemies, and showed no or weak attractiveness to tea pests. Some elicitors in the regurgitation of insect pest played a significant role in this process. Based on these achievements, some behavior regulators of tea pests were developed and applied in tea production. Besides, some sticky boards with different color were developed to attract the adults of whitefly and aphids based on the different physical color-taxis of insect pests. Results showed that every board could attract around one thousand adults of Black Spiny Whitefly (*Aleurocanthus spiniferus* Quaint.). Three hundred boards used in one hectare tea garden can attract 300,000—500,000 adults and the effectiveness is similar to the chemical control method. It was widely used in China tea production. .

With regarding the chemical pesticide selected to use in the tea production, the most important factor is the water solubility of the pesticide. Research showed that the higher the water solubility of pesticide, the higher extraction rate of pesticide in the infusion was. Thus making the more pesticide transfer to the infusion from dry tea and will be intake by human. Based on this investigation, those pesticides with high water solubility are banned to use in tea production, such as Dimethoate, Malathion etc. Besides, the biological control method was recommended to use in the production for minimizing the use of pesticides.

4. Deep- manufacturing

Deep-manufacturing of tea products is the processing process for the production of new products that contain the active integrand of tea by using the tea fresh leaves, dry tea, by-products of tea or leftover bits of tea production as the raw material. It is an important pathway for solving the way out of low quality tea, for promoting the extra value of tea and for extending the chain of tea industry. The following two aspects got the most successful development.

Ready-to-Drink tea was firstly developed in Japan. In China mainland, the RTD tea was firstly developed in 1997. Since then, it was developed rapidly. In 2009 the production of RTD tea reached 8 million tons, 40 times higher than those produced in 1997. The development of RTD tea produced a significant economic efficiency to the tea industry. In 2009, the output value amounted more than 40-50 billion Yuan RMB. It occupied 45-50% of the total tea output value by using 5% of total tea production (middle to low quality tea). It was predicted that the production of RTD tea will be amounted 11 million t in 2011. The other aspect on the deep manufacture is the extraction and application of tea polyphenol and theanine. In China, and used as an antioxidant in the food industry and the healthy products. Investigation showed that tea polyphenol possesses many functional benefits to human. It can be predicted that the utilization of tea polyphenol has a prosperous prospect in the near future.

III. Conclusion

Tea is one of the oldest and most globally relevant beverage and important living necessities for human. Tea also is a healthy beverage. The active component in tea showed many health-promoting functions. Tea industry is a bright industry and showed a sustained development during the past 60 years in China. It must be pointed that there are more challenges existed in the future development, I think the tea industry in China has a more prosperous progress in the future.

References (omitted)