

Research Article

Tea Effects and Landscape Design of Tea Garden

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Abstract: This study analyzes tea effects via the study of the influence of tea polyphenol on rats. Having summarized and generalized the landscape design of tea culture garden, the study ends up with explicit significance of tea garden. During the research, the paper finds that lacking facilities, garden zones are not fully fictionalized with common and ordinary landscapes and not obviously characterized by local cultures. To solve mentioned problems, it is proposed that tea gardens should break through used simple and signal patterns, but fully display multi-functional effects, such as recreation, body-building, reception and garden tour.

Keywords: Landscape design, tea culture, tea garden

INTRODUCTION

Tea is one of the three most popular drinks in the world with various effects. Tea polyphenol within tea is a polyphenolic compound with the main body of catechin, containing tea catechins and flavonoids; it receives a popular attention because of its comprehensive effects, such as anti-oxidation, anti-cancer, anti-radiation, as well as prevention and cure of cardiovascular disease. Having had tea for a long time, Chinese labor force combines culture and etiquette with tea process, namely tea infusion, appreciation, smelling, drinking and tasting, to bring about a special cultural phenomenon (Hou, 2009). Tea garden is an industrial conception satisfying the pursue of the tea garden basis, tea culture. Through exploring and applying tea cultures, tea garden becomes a culture industry garden with economic benefits (Wang, 2009). With function compatibility, tea garden is a combination of cultural-connotative tea varieties and tea culture service, specifically manufacture, exchange, distribution and consumption. In Landscape Planning and Design of Tea Trial Base of Northwest A& F University-Seeking for the Ways of Integrating Tea Culture into Landscape Planning and Design of Sight Seeing Tea Garden, Xutong Yuan and Bin Xiao come upon the idea of making environmental sanitary facility visual and vivid (Zong *et al.*, 2012). Tea garden construction promotes the modernization of new socialist countrysides and the construction of ecological civilization; meanwhile, tea garden provides people with a multi-functional garden to kill time, which enables them to better understand

Chinese tea culture. This study analyzed the effects of tea by studying the influence of tea polyphenol on rats.

MATERIALS AND METHODS

Materials:

- Purchase 40 Sprague-Dawley (SD) rats in SPF degree with weight range from 120 to 160 g from Experimental Animal Center in Anhui. Test the rats in the Quality Supervision and Testing Center of Experimental Animals (in Anhui) whose license is SCXK (wan) 2011-002.
- Collect and resort study process of tea garden and landscape design of tea garden to offer materials for landscape design of tea garden.
- Learn knowledge from landscape ecology, garden aesthetics, theory of landscape design, theory of sustainable development, environmental psychology and tea culture; apply above knowledge into tea garden's design, such as design concept, design principle, general arrangement, sectorization, elevation planning and plant furnishing; redesign Wushan tea garden in Wangcheng based on the research results, to build a comprehensive tea garden where people can plant and produce, process and sell tea and have a tea tour.

Methods: Experimental analysis: feed 40 SD rats for a week to make them adapt to the environment. Then divide the rats into 4 groups on the basis of weight, namely basic control, rapeseed oil, tea polyphenol

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stearate and tea polyphenol oleate. Rats in every group could have food and water freely; but for the later three groups, rats were given intragastric administration of oils each day with 2 g (oil) a kilogram (weight). Control the temperature under 20-23°C and the relative humidity with 50-60%. In the experimental progress, packing was changed every two days and weights were determined every three days. Record the feed in the following 4 weeks. Then fast rats without water-fasting for 12 h and anaesthetize rats with aether. After that, get bloods from arteriae coeliaea and centrifuge the bloods with 4000 rpm under 4°C for 10 min to maintain serum. Finally keep livers, hearts and spleens under -80°C with liquid nitrogen freezing when rats finished rapid anatomy. Having completed above steps, process the data of organ index, serum index, liver index and biochemical indicator.

Reference research: resort and generalize latest news about tea culture and landscape design of tea garden at home and abroad via document literature from Internet, library, electronic databases and related publications. This research was based on comprehensive knowledge, including landscape design, garden eco-engineering, garden design, garden plant resource and its application, dendrology, floriculture and tea culture.

RESULTS AND DISCUSSION

The influence of tea polyphenol stearate and tea polyphenol oleate on rats: To study on oxidation resistance of tea polyphenol, SD rats were fed differently; some were fed compound rapeseed oil with addition of equal 1% tea polyphenol stearate and tea polyphenol oleate and others rapeseed oil only (Pang *et al.*, 2012):

- Rates' food-intake, weight and the growth of organs were not influenced, meaning that the growth of rates in all groups did not show obvious difference (Table 1).
- GHS, CAT and SOD activity in rat serums were much lower in the group of rapeseed oil than in other three groups, but MDA was remarkably higher. Compared to the group of polyphenol stearate and tea polyphenol oleate, the group of

control had lower CAT and SOD activity but higher MDA. Significant difference of CAT, SOD and MDA did not show up between the group of tea polyphenols stearate and tea polyphenol oleate, even that the group of tea polyphenols stearate had higher CAT and SOD activity and lower MDA. Thus it could be concluded that compared to the group of control and rapeseed oil, oxidation resistance was much stronger in the group of polyphenol stearate and tea polyphenol oleate. Besides, the group of rapeseed oil showed higher anti-oxidation than control. The details refers to Table 2.

- With the comparison to the group of rapeseed oil, the groups of tea polyphenol stearate and tea polyphenol oleate were found with much more GSH and CAT, but less MDA in rat livers. Besides, SOD activities were higher. However, when compared to the control, CAT activity and MDA did not have obvious difference, while SOD activity and GSH were notably promoted. In addition, the group of control possessed higher CAT activity than rapeseed oil without remarkable difference of MDA, GSH and SOD activity. Data from the group of tea polyphenol stearate differed from tea polyphenol oleate without significance. Thereby, the oxidation resistance of rat liver was stronger in the group of control and rapeseed oil than two other groups; while the former was stronger than the later. The details refer to Table 3.
- Based on above data, tea polyphenol stearate and tea polyphenol oleate were proved to increase GSH, improve the activity of SOD and CAT and reduce MDA, which illustrated the ability of anti-oxidation of tea polyphenols stearate and tea polyphenol oleate.

Theories and methods of landscape design of tea garden: This study proposed systematic landscape design theories of tea garden on the basis of tea garden realities. Four principles should be applied in landscape design of tea garden and they were measurements suiting local conditions, functional compatibility, experiencing and characterizing (Chen and Wu, 2012).

Table 1: The influence of tea polyphenol stearate and tea polyphenol oleate on rats' organs

| Group | Liver | Heart | Spleen |
|-------------------------|-----------|-----------|-----------|
| Basic control | 3.71±0.40 | 0.03±0.02 | 0.19±0.03 |
| Rapeseed oil | 3.69±0.30 | 0.30±0.02 | 0.19±0.02 |
| Tea polyphenol stearate | 3.74±0.26 | 0.31±0.02 | 0.20±0.02 |
| Tea polyphenol oleate | 3.70±0.17 | 0.31±0.02 | 0.21±0.02 |

Table 2: The influence of tea polyphenol stearate and tea polyphenol oleate on oxidation resistance of rat serum

| Groups | CAT (U/mL) | MDA (nmol/mL) | GSH (mg/L) | SOD (U/mL) |
|-------------------------|------------|---------------|------------|--------------|
| Basic control | 18.75±2.31 | 8.72±1.280 | 9.820±3.36 | 265.22±75.79 |
| Rapeseed oil | 1.45±0.32 | 11.64±2.57 | 4.740±0.85 | 148.97±37.60 |
| Tea polyphenol stearate | 25.83±2.42 | 3.01±0.420 | 10.82±2.75 | 504.66±33.21 |
| Tea polyphenol oleate | 24.43±2.45 | 3.59±0.810 | 10.84±3.10 | 446.62±58.63 |

Table 3: The influence of tea polyphenol stearate and tea polyphenol oleate on oxidation resistance of rat liver

| Groups | CAT (U/mg prot) | MDA (nmol/mg prot) | GSH (mg/g prot) | SOD (U/mg prot) |
|-------------------------|-----------------|--------------------|-----------------|-----------------|
| Basic control | 9.22±1.04 | 3.48±0.57 | 2.09±0.39 | 56.05±19.690 |
| Rapeseed oil | 7.75±1.42 | 5.11±0.34 | 1.91±0.61 | 47.71±11.640 |
| Tea polyphenol stearate | 9.81±2.18 | 1.98±0.29 | 7.76±0.94 | 139.55±20.68 |
| Tea polyphenol oleate | 9.33±1.21 | 2.08±0.20 | 6.25±0.50 | 135.88±16.90 |

Landscape structures and functional sectors of tea garden:

Landscape structure: Firstly, the complete arrangement of tea garden must reduce earthworks on the condition of maintaining the original sites. And the construction of tea garden should start from the simulation of tea garden and continue with microrelief modification based on initial land-forms. Secondly, division of gardens according to different functions would make landscapes seem successive and unique, by applying design of garden path pavement and planting design; at last, architectural sketches and garden paths would connect the garden as a whole.

Functional sectors: Few sectors should be considered in tea garden, like activity sector, production and processing sector, culture display, vacation and sightseeing, picking experience and entertainment and dining.

Keys of item design: According to garden inscapes, item designs of tea garden would point at designs of land-form, plant, water, garden path and architecture. And idea of natural environment construction embodying tea cultures was also considered (Tang, 2012; Lin *et al.*, 2008):

Site investigation and land-form design and usage: Earthworks should be as less as possible in the land-form design of tea garden. It is better to have microrelief modification after accounting original topography and tea natures. The designs of Tea hill, slope, footpath and ridge should learn from the nature and created rich space layers with inscapes to make people lose sight of the tea garden when they were in the garden.

The design of garden path: As the framework of garden, garden path guide, dismiss and lead tourists when necessary. The width and grade of slope of garden path varied with the scale and function of tea gardens. Adopting interrelations among stone, water and plants, the design of tea garden referred to the style of Chinese classical gardens to display garden path's function of organizing lines and composing garden landscape.

The design of water scenery: Gardens came into alive with hills and water among which water made garden full of life and energy. The combination of water and earth enriched landscape. While with dynamic and

static features, the man-made garden would be more natural. As for the design of water scenery, the goal was different sightseeing with feet movements. To have in-motion viewings, water, land-form, plants and architectures should be taken as a whole and designed naturally. Water system with twists and turns made it linger in tourists' minds; the size of water surface should be flexible with big ones and small ones, so that tourists would get visual content. With such design, the tour was not boring with the alternative performance of dynamic and static landscape. Patterns, styles and revetments of water should be considered when design water scenery that extent space, regulated micro-climate and bore activity.

The design of planting: The design of planting should take tea as the main body and choose plants whose nature was in accordance with tea. Choices of trees was according to the landscape needs, putting native trees in first place and being complemented with other trees. The addition of ornamental plant, tea plants and economic trees would enrich landscape.

CONCLUSION

Tea is more than a traditional food culture; meanwhile, tea plays effect on free radical removal for its containing of various antioxidants and antioxidant nutrients. That is why tea is helpful in aging prevention and health caring; and two or three cups of tea each day enables to slow down the aging. A variety of vitamins and amino acid contained in tea does well for greasiness removal, nervous excitation, digestion and diereses. As a traditional culture, tea culture pushes tea economics moving forward in a high speed, playing a vital role in social functions. Tea culture gives tea economics humanities, activates tea market, drives tea industry and improves tea image. As for promotion of tea garden economics, landscape design of future tea gardens can do more research on landscape features, local uniqueness, tea garden service, introduction of new species and landscape variety. It is believed that the polish of tea-related theories will be significant in instructing the practice of landscape design of tea garden.

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