

THE EFFECTS OF PROLONGED YELLOWING ON THE QUALITY AND

CHEMICAL COMPOSITION OF FLUE-CURED TOBACCO

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Abstract

A study was conducted to evaluate the effect of prolonged yellowing on the quality and chemical composition of flue-cured tobacco (*Nicotiana tabacum*). Ripe flue-cured tobacco leaves were maintained at dry bulb temperature of 38°C and wet bulb temperature of 36°C for up to 8-32 h after yellowing was basically completed. The results showed that the dry-mass declined linearly. Most of the starch was degraded during over-yellowing and the remainder was continued degrading during over-yellow. The results suggested that over-yellowing for up to 8 h (lower leaf), 12 h (middle leaf), 16 h (upper leaf) improved quality and may be associated with starch degradation.

Introduction

In recent years, the natural ventilation common barn of tobacco-growing areas in China basic replaced by hot air circulation bulk curing barn, some cigarette manufacturers thinks the lack of tobacco aroma through bulk curing, this is probably mainly due to the inadequate curing process to turn yellow, leaf material decomposition is not enough. To find out whether this reason, this study was conducted.

1. Materials and methods

Test barn for key 3-Xiang, 1th-intensive flue-curing room, established a total of 3 (T1, T2, and CK1), each processing for one barn, another CK2 for not flue-curing process, the fresh tobacco leaves drying directly in the oven, as dry matter reference indicators for the consumption of tobacco leaf flue-curing process. Experimental varieties K326, regular cultivation. The testing specific design was shown in table 1.

2. Results and analysis

2.1. The appearance of delaying yellowing tobacco leaves

The appearance of CK before beginning to warm up at 38°C in the conventional flue-curing: most tobacco leaves for yellowing, near the main veins are not basely yellow, and yellow midrib most, the main veins not yellow, leaves yellowing to 7-8. At the same time the blade wilting, leaves dehydration to collapse. The appearance of T1 after extension of yellowing time: tobacco leaves becomes yellow entirely, and the midrib yellow, the main vein mostly yellow, leaves yellowing to 8-9. At the same time the main veins wilting, leaves dehydration to collapse (Fig. 1).

The appearance of T2 after the further extension of yellowing time: tobacco leaves becomes yellow entirely, and the midrib yellow, with the main vein yellowing too, leaves yellowing to 9-10. At the same time the main vein withered to soft, leaves dehydration to collapse fully.

2.2 The drying matter consumption of tobacco leaves in delaying yellowing process

The drying matter consumption of tobacco leaves in delaying yellowing process, results as shown in figure 2-4.

Table 1 The design of the experiment

Treatments	The design of the experiments
T1	On the degree of CK1 yellowing, dry-bulb temperature 38 °C continues to be, the lower part of leaf delay time of yellowing for 8 h, the middle leaf delay yellowing 12 h, delay upper leaves turning yellow 16 h, dry ball for 54 °C after the big roll of tobacco leaf delay 10 h, the maximum temperature is 65 °C in stem-drying Stage.
T2	On the degree of CK1 yellowing, dry-bulb temperature 38 °C continues to be, the lower part of leaf delay time of yellowing for 16 h, the middle leaf delay yellowing 24h, delay upper leaves turning yellow 32 h, dry ball for 54 °C and after the big roll of tobacco leaf delay 10 h, the maximum temperature is 65 °C in stem-drying Stage.
Ck1	The conventional Flue-curing, dry bulb temperature 38 °C stable end of conventional yellowing degree (lower leaves become yellow, 7-8, 8-9 in upper leaves become yellow) is heating up. Dry bulb temperature for 54 °C and after the big roll of tobacco leaf without delaying, the maximum temperature is 68 °C in stem drying stage.
Ck2	Not flue-curing, Immediately drying tobacco leaves after harvest.



Fig.1 The external property on appearance after over-yellow (left: T1, right: T2)

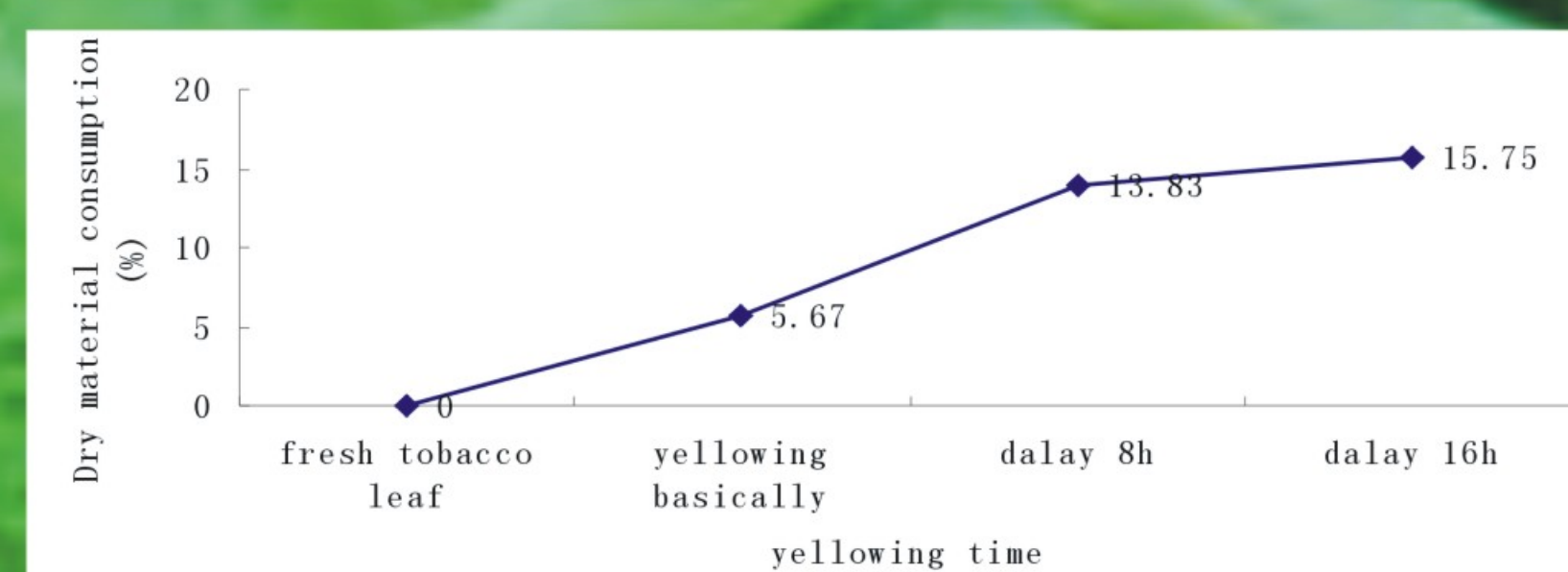


Fig. 2 The dry-mass loss during over-yellow of the lower leaf

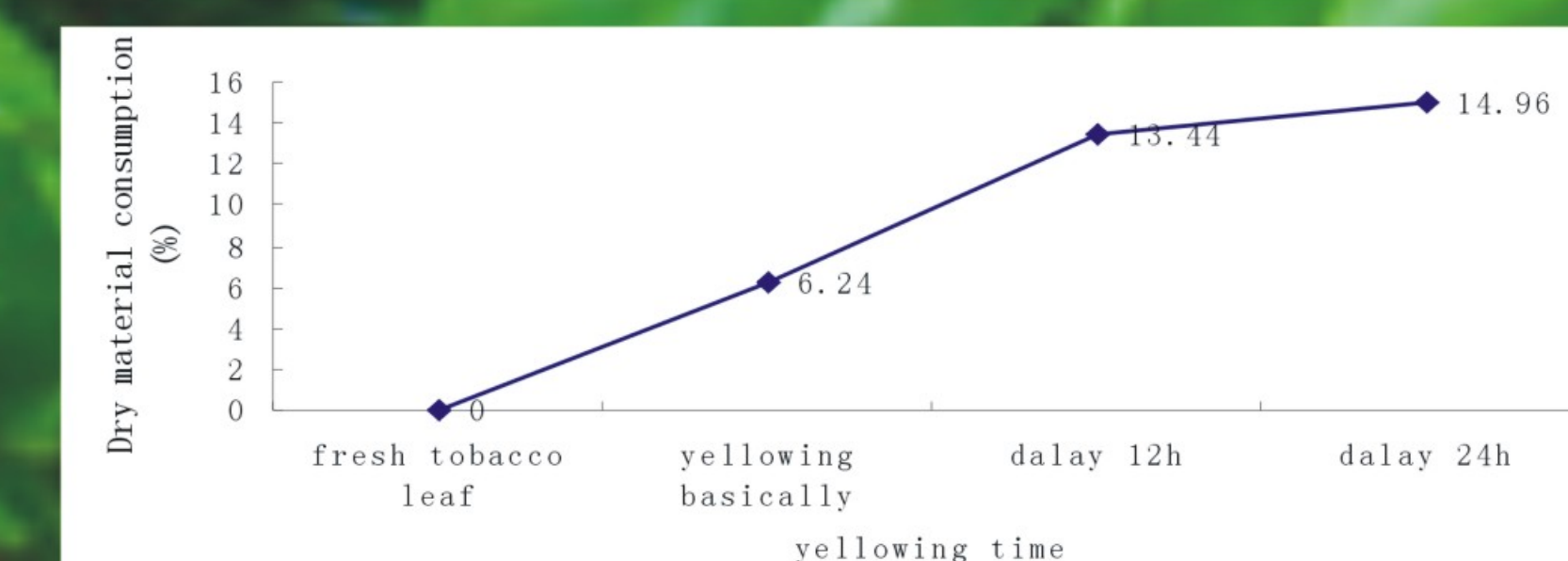


Fig. 3 The dry-mass loss during over-yellow of the middle leaf

2.3 The changes of the starch and reducing sugar in the different position during over- yellow

The changes of the starch and reducing sugar in the different position during over-yellow, results as shown in figure 5-7.

2.4 Each treatment, parts of tobacco leaves grading results

Each treatment, parts of tobacco leaves grades, the results are shown in figure 8-9.

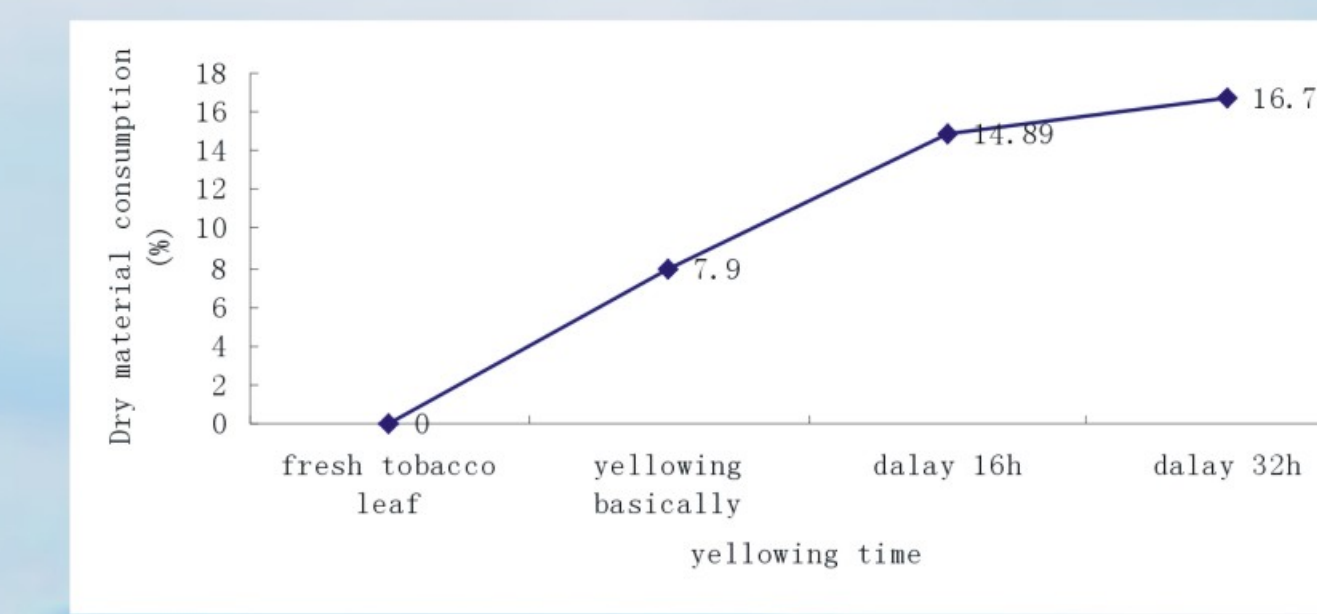


Fig 4 The dry-mass loss during over-yellow of the upper leaf



Fig5. The changes of the starch and reducing sugar of the lower leaves during over-yellow

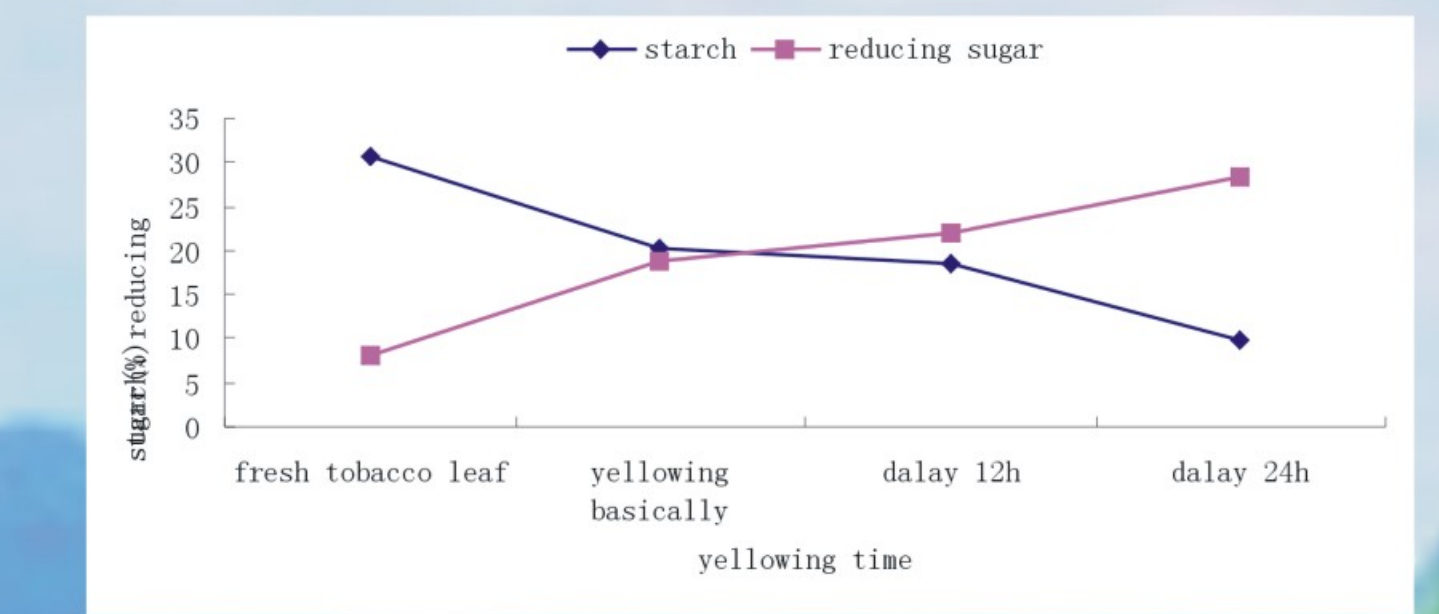


Fig6. The changes of the starch and reducing sugar of the middle leaves during over-yellow

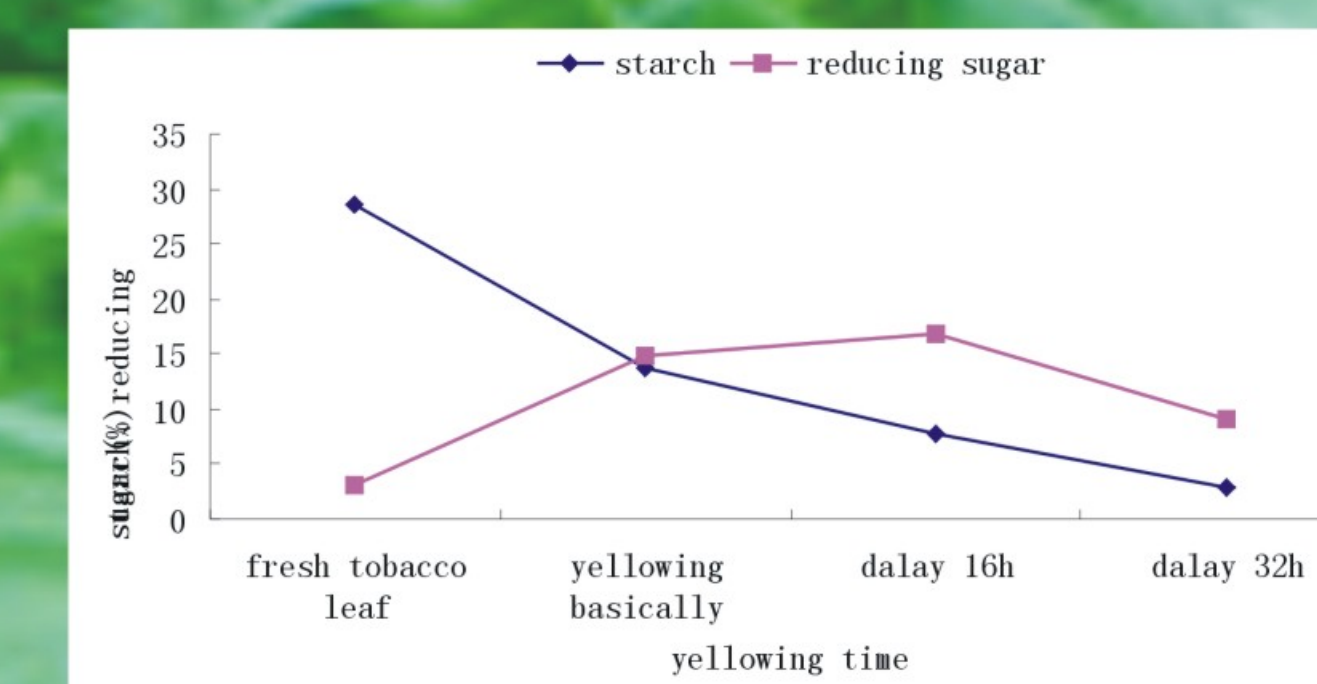


Fig7. The changes of the starch and reducing sugar of the upper leaves during over-yellow

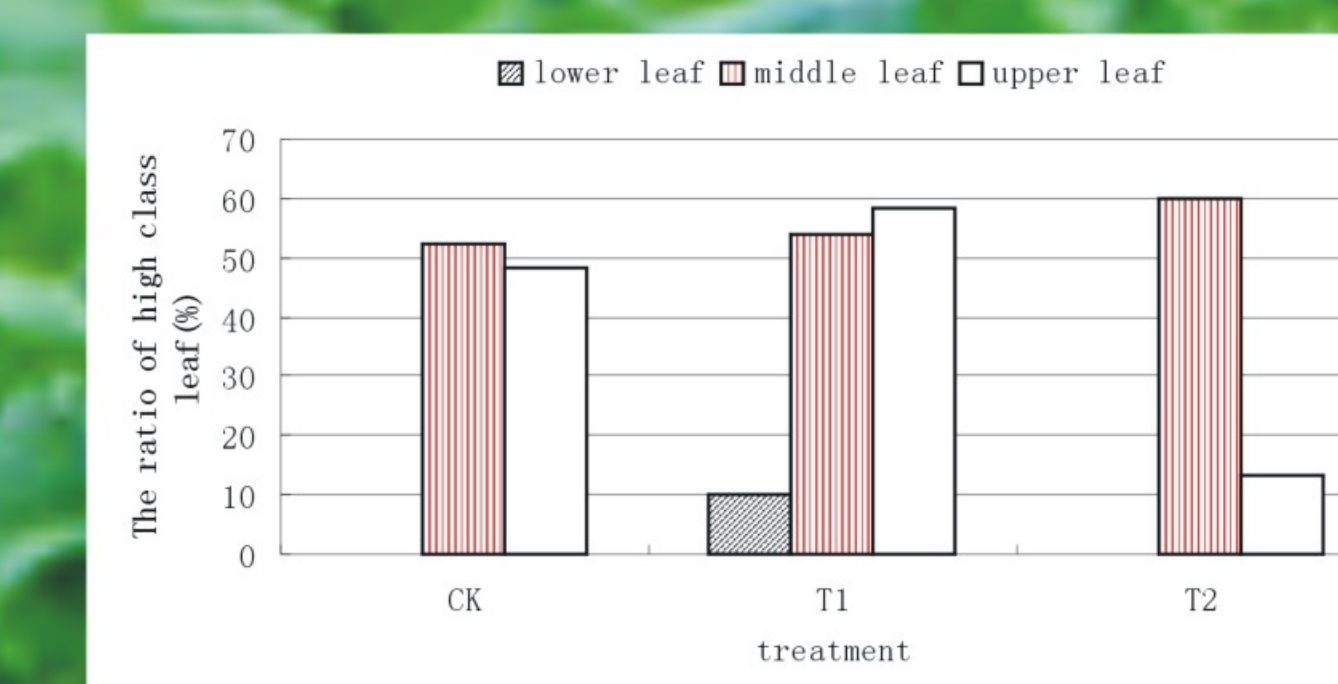


Fig.8 The ratio of high class leaf in the different treatments

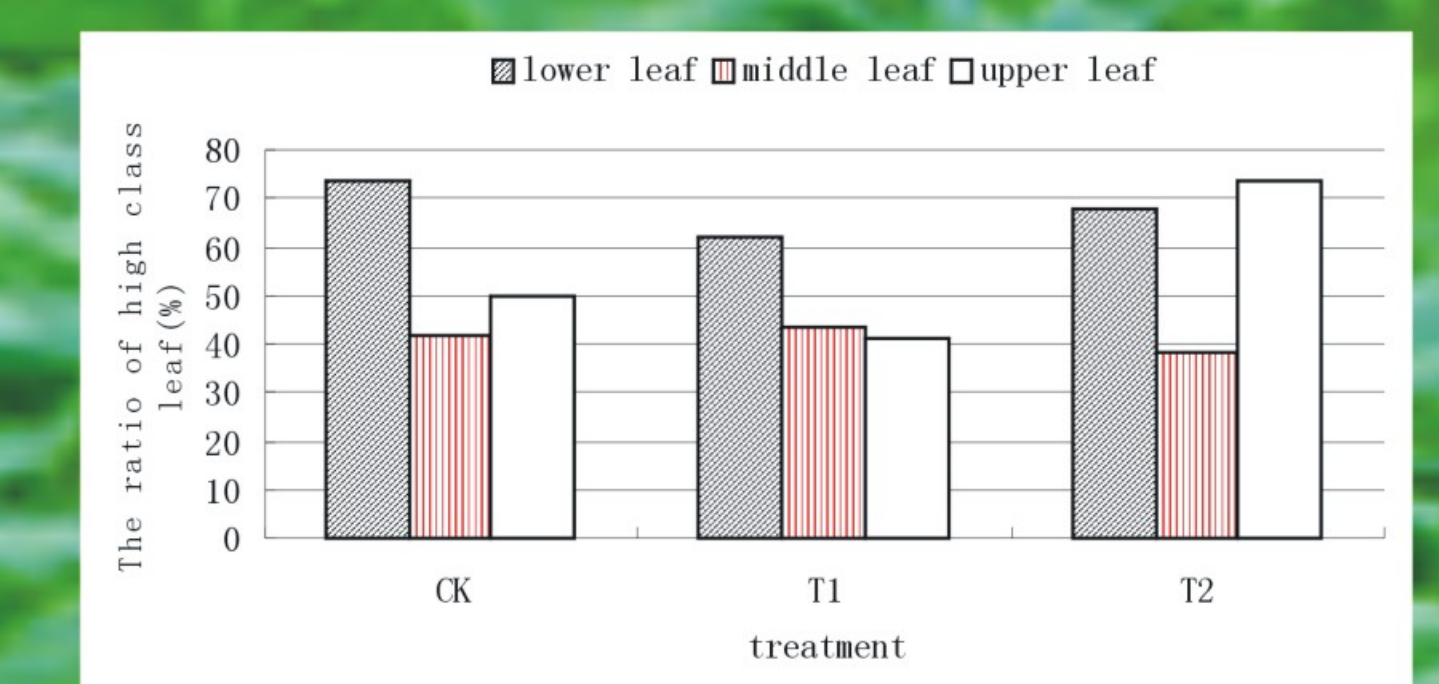


Fig. 9 The ratio of middle class leaf in the different treatments

2.5 The Smoking evaluation results of cured leaf

The evaluation results of cured leaf in each treatment were that the aroma quality of tobacco leaves in different positions improvement along with the over-yellow degree. And the aroma quantity with the over-yellow degree also was increased somewhat, total score was T2>T1>CK1.

2.6 The appearance quality of the cured leaf for over-yellow

The appearance quality of the cured leaf in different treatments for over-yellow was that the maturity was improved, leaf tissue structure was loosened, and it is conducive to the orange color in flue-cured tobacco leaf.

2.7 The Cost of energy source of leaf curing

The Cost of energy source of leaf curing for over-yellow leaves were: the lower leaf for T2>CK1>T1, the middle leaf for CK1>T1>T2, and the upper leaf for T1>T2>CK1 in the unit coal consumption cost. The above results indicated, delay yellowing did not necessarily increase the cost of energy consumption of tobacco leaf flue-curing, sometimes reduced, this is because delaying yellowing which energy dissipation is not much in the low yellowing stage and improve the yellowing degree, color fixing stage could shorten and reduce energy Consumption.

3. Discussion

The results of this study showed that, during bulk curing process, appropriate delay yellowing time, which can make leaf material fully converted, after curing orange leaf and the proportion of high quality tobacco leaf increased, the starch content decreased, chemical composition tends to coordinate better, aroma quality and aroma quantity were increased too. However, yellowing time should not be too long by delay; otherwise, the appearance quality of tobacco leaf will be affected. The ratio of high class leaf of the treatment decreased, thus affecting the output value.