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THE EFFECT OF RELATIVE HUMIDITY ON THE STORAGE LIFE OF MADE TEA

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This investigation was carried out to determine the changes in made tea characteristics when black tea was stored at various relative humidities.

Deterioration on storage was found to accelerate with relative humidity. It was found that for low humidities in the region of 32.3%, teas could be stored for a period of 300 days without loss of tea character whereas for a relative humidity of 100% teas were reported as flat after 15 days of storage.

The liquors of some freshly-fired teas are sometimes described as 'raw' or 'greenish', but this character may become less marked after a period of storage. Longer periods of storage, however, especially under conditions which are not light and moisture excluding, lead to 'softness' of tea (Keegel 1956; Wickremasinghe & Perera 1972). It has been found that tea deteriorates rapidly if the moisture content is above 6%, deterioration being especially rapid at high temperatures (Keegel 1956). Wickremasinghe & Perera (1972) have shown, that chemical changes take place during the storage of black tea. The present work was carried out to determine how these chemical changes influence made tea characteristics of high grown BOP* stored in air at various (constant) humidities (rh) at a temperature of 20°C, under light excluding conditions.

EXPERIMENTAL

Saturated salt solutions of potassium acetate, calcium chloride hexahydrate, sodium dichromate dihydate, sodium nitrite and ammonium chloride were placed in desiccators, which served as constant humidity chambers, whose equilibrium relative humidities were determined by reference to the International Critical Tables (Spencer 1926). The method of preparation of the saturated salt solutions was the same as described by Jayaratnam & Kirtisinghe (1974). Humidities of 3, 5 and 12% were obtained by desorbing the desiccator with silica gel. Calibrated paper hygrometers were used to read their approximate rh.

High grown BOP obtained from 1st, 2nd and 3rd dhools by orthodox-rotorvane manufacture of clone DT 1 and also, St Coombs bin BOP were placed in constant humidity chambers. These samples, were evaluated by the TRI Taster, at regular intervals on the basis recommended by Keegel (1959). The samples which were stored at very low rh were evaluated initially and once again after a period of 300 days of storage.

RESULTS AND DISCUSSION

The moisture content in samples equilibrate rapidly with the water vapour pressure of the surrounding atmosphere in the constant humidity chambers, and remains at this level of moisture till the end of the experiment. The equilibrium moisture content (M) (Jayaratnam & Kirtisinghe 1974) for different rh is given in Table 1.

*Broken Orange Pekoe

TABLE 1 — *Value of Equilibrium Moisture Content (M) of BOP for different relative humidities (rh) at 20°C*

rh (%)	M (% Dry Basis)
100	36.84
79.2	14.35
66	11.35
52	7.97
32.3	4.34
20	3.62
12	2.45
5	1.35
3	1.00

1—Period of Storage

The samples stored at 100% rh when evaluated after 15 days of storage were reported as flat. The samples stored at 79.2% rh, evaluated after 60 days still had tea character, but were flat after 120 days. It was found, however, that the valuation of these samples during this period had significantly declined ($P<0.05$). The same was true of samples stored at 66% rh. The samples stored at 52% rh had tea character when evaluated after 180 days of storage, but their valuation had reduced significantly ($P<0.05$). These samples had lost their tea character after 300 days of storage. In contact with air at 32.3, 20 and 12%, rh samples were found to retain their tea character even after 300 days of storage, but their valuations had significantly declined ($P<0.05$) during this period. It was found, however, that the valuation of samples stored at 20 and 12% rh had not significantly declined during a period of 180 days of storage, and that of samples at 32.3% rh stored for 120 days also did not decline. The samples stored at 5 and 3% rh had tea character when evaluated after 300 days of storage but their final valuations were lower than their initial valuations.

2—Made tea character

No significant change in infused leaf appearance was apparent in teas stored at 12 to 66% rh while teas retained their tea character. The infused leaf became significantly duller ($P<0.05$) with period of storage when stored at 79.2 and 100% rh.

(*b*) *Colour of liquor*

The colour of liquor of samples stored at 12, 20 and 32.3% rh did not change significantly with time, for a period of storage of 300 days. These humidities fall within the humidity range ideal for storage of tea (Jayaratnam & Kirtisinghe 1974). Storage at humidities ranging from 52 to 100% resulted in the liquor becoming more coloury with time, but the taster reported that this colour though deeper was turning dull.

(*c*) *Strength of liquor*

The strength of liquor of the samples stored at 12 to 100% rh did not change, with time. This shows that strength of liquor is independent of humidity of storage, in the range under consideration.

(*d*) *Quality of liquor*

No significant change was observed in the quality of liquor in the samples stored at 12 and 20% rh upto a period of 300 days of storage. Significant changes were observed in the samples stored at 32.3 to 100% rh with period of storage, upto the

time the teas retained their character. It was observed however that the quality of liquor, of samples stored at 32.3% rh did not change significantly for a period of storage of 120 days. Within a range of 12 to 32.3% rh teas could thus be stored for a period of at least 120 days without significant loss in quality.

(e) Valuation

A significant decrease in valuation ($P<0.05$) was observed with period of storage in all samples stored 12 to 100% rh. No significant change in valuation was however observed in samples stored 12 and 20% rh for a period of 180 days and for a period of 120 days of storage at 32.3% rh. This is in accordance with observations on made tea characteristics.

In studying the effect of rh on made tea characteristics with period of storage, one limitation is that the samples cannot be compared with a standard as the standard too changes with period of storage. A further consideration is the fluctuation in the market prices. The average market price has been considered as a standard for purposes of comparison of valuations.

CONCLUSIONS

Teas can be stored at 12, 20 and 32.3% rh for a period of 300 days, without loss of tea character. Teas can also be stored at these humidities without significant change invaluation or other made tea characteristics including quality, for a period of 120 days at 32.3% rh and for a period of 180 days at 12 and 20% rh.

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