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APPLICATION OF COMBINED SENSORY ASSESSMENT TEST FOR QUANTITATIVE EVALUATION OF QUALITY OF ROASTED COFFEE

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The combined sensory assessment, consisting of difference testing (triangle test) and consecutive scoring of 4 quality characteristics of roasted coffee has been done. Preliminary difference testing helped to eliminate non-discriminating judges, what improved the uniformity of panel results in scoring. The advantage of using discriminatory analysis for evaluation of scoring results was finally demonstrated.

Experience shows that paired comparison, duo-trio, and triangle tests are most sensitive sensory assessment methods for disclosure of differences in particular characteristics, which determine the palatability of two products. Nevertheless, these methods are seldom adopted for the daily routine, as the standard prescribes a quantitative evaluation based on scoring for most of the products. The application of difference tests is reasonable only by products for the evaluation of which the standard prescribes comparison with reference sample.

Difference tests are also suitable for quantitative evaluation of an attribute if the direction of the difference between the samples — namely, which of them is preferred in respect of the investigated characteristic — is qualified with application of several grades. This however may seldom be extended to the evaluation of more than one attribute and therefore it provides far less information than the standard scoring procedure.

In course of our investigations, the object of which was the comparison of coffee samples prepared by traditional and new roasting technology and the quantitative determination of differences, the two sensory methods were combined successfully.

Coffee brew drink from different coffee samples was prepared by the uniform method and it was presented to the assessors in triangular tests. The first task of the assessors was to solve the triangle test, that is to discriminate between the two sorts of coffee. Then, the four attributes of the selected samples were rated along a scale of five grades. The evaluated attributes were the following: odour, acid taste, bitter taste, flavour.

As our experiences demonstrate, the assessors can accomplish not more than two such tests, one immediately after the other, without considerable deterioration of reliability.

The investigation was repeated for several weeks, as the effect of storage on the quality of coffee sorts was also to be studied, thus very many data were obtained by the application of the combined method, the results of which are summarized below:

Valuable informations were obtained concerning the aptitude of the assessors when the correct answers fall the triangle test series of each assessor were summarized. The examined 13 assessors gave correct answers in an average of 60% of triangle tests, but four assessors were found, who gave correct answers only in 30 - 50%, i.e. they could not discriminate between the samples, because for triangle tests the probability of giving correct answers is by chance 1/3. Obviously the scores given by these latter assessors are also irrelevant. Excluding these persons, the other assessors gave correct answers in 73,5% of the assessments. This proportion is considered a significant improvement, because while the panel had to accomplish at least fifteen assessments to elicit a significant result, the selected assessors could give significant answer by seven trials. Thus the data obtained with this method may be employed advantageously for the selection of assessors.

The results of those solving the triangle test incorrectly appear in the rating also with a smaller weight, because when discriminating the samples incorrectly the assessor gives one of the scores to a pair of samples, which represent none of the two sorts either, for the pair contains both of them. The rejection of the ratings of those having given incorrect answers is reasonable only if the selected panel in turn discriminated the samples in the triangle test significantly. Otherwise it is sufficient if — as a result of the mechanism mentioned formerly — the weight of those giving incorrect answers is only reduced in the mean value of the scores.

At the qualification of coffee samples considerable decrease of scores dispersion was observed because of the afore mentioned mechanism. While with the usual scoring evaluation a 30 - 50% dispersability of the total scores was obtained, with the combined method this was only 20%. This renders quantitative observation of smaller differences also possible.

Should the examined two samples be proven different by means of triangle test — and for the samples in question this was the case — the scores gave information about the reason of the difference, as well as about the size of it. Discriminatory analysis may be applied with success for determination of the sharpness of discrimination, for decision, which is the most essential component from the aspect of difference between two samples and, last but not least, for the determination of weight of each component in the total scores.

Triangle test decides whether the two samples are different, discriminatory analysis in turn gives, which are the most essential attributes in determination of the difference.

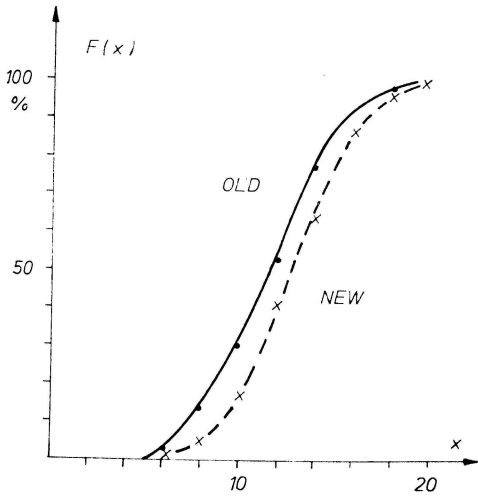


Fig. 1 Distribution of total scores

At the examination of coffee samples with discriminatory analysis the score weight of acid taste and flavour was found almost one order greater than that of odour and bitter taste. Indeed, for these two components 0.3 and 0.6 mean score difference is observed to the advantage of the product manufactured by the new technology. The distribution of the total scores

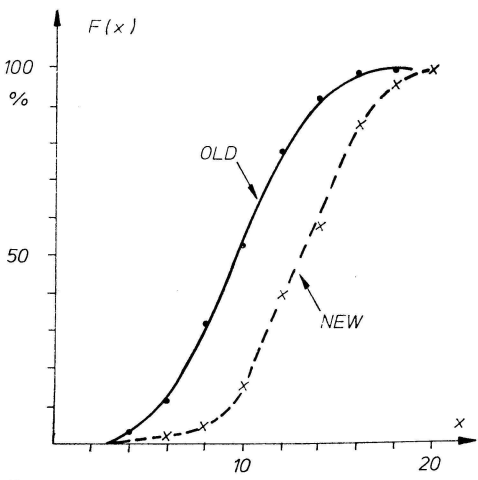


Fig. 2 Distribution of total scores calculated from the discriminatory analysis

determined by discriminatory analysis was characteristically different for the two samples. While the score distribution functions obtained by simple addition showed a 45 - 50% overlap, those calculated with discriminatory analysis exhibited not greater than a 25 - 30% overlap, which is clearly seen on the figures. Fig. 1 delineates the distribution function calculated from the traditional total scores, while Fig. 2 shows that derived from the total scores of discriminatory analysis.

The total scores obtained this way change characteristically with storage time. The total scores of the product manufactured by the traditional technology exhibited no significant correlation to the time: $r = -0.58$; the scores of the product of the new technology deteriorated with a rate 0.07 point/day and the process is characterized with a correlation coefficient $r = -0.89$.

To summarize the results, the advantages of the combined sensory method are the following:

1. It provides information for controlling the capacity and evaluation conditions of the assessors and is applicable also for their selection.
2. The omission or the reduction of the weight of the results of those giving incorrect answers contributes to the decrease of the dispersion of results, so it augments the reliability of results and the sensitivity of evaluation, and reduces the secondary errors.
3. The method serves as a base for the application of discriminatory analysis, which promotes the sharpness of discrimination in comparison of two samples and stresses the most important differences.

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OCENA SENSORYCZNA PALONEJ KAWY METODĄ KOMBINOWANĄ

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Streszczenie

Przedstawiono metodę oceny naparów kawy pochodzących z próbek kawy palonej w różny sposób i następnie przechowywanej przez różny okres czasu. Metoda jest połączeniem testu trójkątowego z oceną punktową 4 wybranych cech jakości: zapachu, smakowości ogólnej, kwaśności i goryczy naparu kawy przygotowanego w standardowy sposób. Postępowanie polega na prezentacji próbek, jak w teście trójkątowym i stwierdzeniu, które dwie z nich są identyczne, która zaś odmienna; następnie oceniający dokonuje oceny punktowej wymienionych 4 wyróżników w każdej próbce. Metoda pozwala na jednoczesną selekcję osób (indywidualne wyniki osób, które nie rozróżniają poprawnie próbek są odrzucane) oraz zmniejszenie dyspersji wyników oceny punktowej. Te ostatnie wyniki mogą być interpretowane przy zastosowaniu statystycznej analizy dyskryminacyjnej.