Chemical quality of the 'Agmark' grades of black pepper berries

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Abstract. Fifteen export grades (Agmark) of Indian black pepper have been studied for their chemical quality. The most popular grades MG I and II are quite rich in flavour components and medium in starch, whereas the heaviest and largest (T Geb) are rich in starch and medium in flavour components. The lightest (Pinheads) are rich in per cent pipierine and poor in aroma and starch. Weight of berries does not appear to be directly related to flavour characteristics.

Introduction

India had been exporting black pepper since the Second and First Millennia BC. Even today, it maintains a major role as an exporter of spices. Black pepper accounts for more than 55 per cent of India's export trade in spices [1]. India exports 20 to 25 thousand tonnes of black pepper annually earning a foreign exchange of Rs 35 to 40 crores [7].

India was the first country to adopt quality control and preshipment inspection in black pepper at the export level [1]. In order to ensure that only good quality pepper is shipped, all exports are subjected to compulsory quality control and preshipment inspection.

There are more than 70 cultivated varieties of black pepper existing in India [8]. They differ in size and colour of berries, length and shape of spikes, yield, resistance to diseases, etc. Black pepper of commerce is a mixture of berries which vary in the above characteristics. In the international market, preferences differ from one consuming country to another. Considering the varying needs of buyers, grading of produce was enforced. For this purpose, standard grades are prescribed by the Government of India [10].

The Agmark grades of black pepper have been formulated on the basis of size, extraneous matter, pinhead and light berry contents and other physical characters. In grading, moisture content is also considered.

Indian black pepper, under the Agmark grading system, is classified into eight different schedules, consisting of fifteen specific grades and one non-specific grade. For the best grades of Indian black pepper, a very low limit of not more than 2–3 per cent of light berries are allowed. Moisture content is not allowed to exceed 11 to 12 per cent (a low moisture level prevents the formation of mould during transit).

Apart from the grade and cleanliness of spices, their flavour (aroma and pungency) is most important to the consumer. An attempt by Dwarkanath et
al. [5] was made to study the chemical quality of some of the black pepper trade grades. However, it was not an extensive study. Hence, the objective of the present study was to screen all the approved trade grades (the standard Agmark Grades) for their chemical quality and also for a few of their major physical characteristics. An attempt has also been made to relate the general consumer preference of the popular grades to their chemical quality.

Material and methods
All the Agmark grades (given in Table 1), except the non-specified (NS grade X), were collected with the help of the respective marketing officers responsible for the Black Pepper Grading Schemes at Calicut and Cochin. The materials (packed in polyethylene bags) were brought to the Research Institute, milled to fine powders, stored in glass containers and studied for their chemical quality.

Moisture percentage was determined by the toluene distillation method [2], essential oil content was estimated by the steam distillation method using a modified Clevenger trap [3], oleoresin was estimated by the cold percolation of acetone method [9], piperine was estimated spectrophotometrically using carbon tetrachloride as the solvent [6]. Starch content was determined by direct acid hydrolysis [4].

Apart from these chemical characters, average diameters and weights per berry were measured and the average number of berries per gram determined.

Results
Results of the study are given in Tables 1 and 2.

Physical characters
Grades I, III, II, XII and XI were superior in their berry diameter. Grades XIV and XV were found to be smaller among these grades. Grade I was the heaviest (as expected) with XIV the lightest. The maximum number of berries per gm was observed in Grades XIV and XV. Grades V, VI and VII had intermediate values for the characteristics studied.

Chemical characters
It is quite interesting to notice that Grade I berries which are superior in their physical characteristics (a, b and c; Table 1) are not so chemically, except for % starch (i; Table 2) which although a desirable character for the powdered spice industry, is not a flavour characteristic. Grades V and VI berries, though medium in physical characteristics (a, b and c; Table 1), are quite superior in their flavour characteristics (e, f, g, h; Table 2). Their low starch content is a favourable characteristic as viewed by the flavour industry. The boldness and bulky nature of Grade I and II berries are mainly due to their high