

Indexing Quality Parameters in Black Pepper Cultivars

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Piperine, oleoresin and essential oil show marked variations in different pepper cultivars and are indicative of chemical quality (Govindarajan, 1977). In black pepper a portion of non protein nitrogen is found in piperine, an alkaloid responsible for pungency. Oleoresin defined as the total soluble extractive in a specific solvent is a concentrate of all the pungency and flavour component. Volatile oil which is essentially the flavour moiety of the spice and piperine the pungent principle are the important quality attributes of black pepper.

Most pepper cultivars, except Karimunda and Panniyur-I have restricted distribution. Systematic collection and evaluation of all the pepper cultivars from the states of Kerala and Karnataka has been taken up by the Central Plantation Crops Research Institute, Regional Station, Calicut. To facilitate easy accessibility of quality parameters to researchers and technologists 69 pepper cultivars are indexed based on the scale devised for this purpose and are categorised into high, medium and low quality types based on piperine, oleoresin and essential oil levels.

Materials and Methods

Pepper is harvested at uniform mature stages and sun dried for

5 to 7 days and powdered for analysis and stored at low temperature to prevent the loss of volatiles. Piperine is estimated as per the method of Tausig *et al.* (1956). Oleoresin is extracted by cold acetone percolation method and solvent is later removed by vacuum distillation. The oleoresin after removal of solvent is estimated by gravimetry. Essential oil is estimated by steam distillation using a cleverger trap for collecting oil. Assuming that the chemical quality constituents follow a uniform distribution pattern standard deviation is calculated. Pepper cultivars are ranked as high, medium and low depending upon the mean and standard deviation values.

Results and Discussion

Pepper cultivars have been categorised into high, medium and low depending on the respective piperine, oleoresin and essential oil levels and are presented in Table 1. Among 69 pepper cultivars categorised 10 each are indexed in high and low categories. Kumbhakkodi contained high piperine content (7.60%). Among the popular cultivars one collection of Kuthiravally has 5.97% piperine where as one collection of Karimunda contained 6.25% piperine.

Oleoresin content varied from 9 to 15%. Cultivars whose oleoresin content is high are Kottanadan, Kumbhakkodi, Kuthiravally and Nilgiris.

Most of the cultivars contained 4.40-2.40% of essential oil. Popular cultivars having high essential oil are Kuthiravally, Kalluvally and Karimunda.

Variations in the chemical constituents within the same cultivar collected from different locations were observed. This may be due to intrinsic heterogeneity in the cultivar itself. The variability in these chemical constituents and relative ranking depending upon standard deviation scale is presented in Table 2.

In Karimunda, a collection from Pulpally (Wynad) appears to be desirable due to its high piperine and essential oil contents. Kalluvally type 3 is comparable to Karimunda in piperine and essential oil levels. The total extractable solids in both these however, appear to be low. Kuthiravally, containing high piperine and essential oil is better due to its high extractable solids.

Nilgiris contained high oleoresin, essential oil and piperine contents, cultivars from Karnataka region are generally poor in their chemical quality, Kottanadan, a cultivar

generally grown in South Kerala has high oleoresin and piperine contents with medium levels of essential oil.

High variability in quality components in Karimunda and Kalluvally cultivars is an indication of the potential for quality improvements in these cultivars through selection programme.

Summary

An effort is made in this paper to group various black pepper cultivars on the basis of piperine, oleoresin and essential oil levels. The high piperine group is comprised of ten cultivars, high oleoresin group nine cultivars and the high essential oil group twelve cultivars. Kottanadan, Kumbhakkodi and Kuthiravally are the high piperine-high oleoresin cultivars. Out of these Kumbhakkodi and Kuthiravally have high essential oil content also.

References

- Govindarajan, V.S. (1977). Pepper Chemistry, technology and quality evaluation, *CRC Critical reviews on food Sci. Nutr.* 9 (2): 115.
- Tausig, F., Zuzuki, J.I. and Morse, R.E. 1956 Observations on black pepper: analysis of bite principles. *Food techn.* 10:151-4.

Table 1. Categorisation of pepper cultivars on the basis of the levels of piperine, oleoresin and essential oils.

Constituent	Name of the cultivar	Category and level of the constituent
Piperine	Ceylon, Kaniyakkadan, Kottanadan, Kumbhakkodi, Kuthiravally, Munda, Nilgiris, Perumunda, Taliparamba Local, Karimunda.	High 5.49
	Arikottanadan, Arakulamunda, Balankotta, Cheriakaniyakkadan, Chumala, Doddappa, Kalluvally (I), Kalluvally (II), Kalluvally (III), Karimunda (I), Karuvilanchy, Mundi, Narayakodi, Paullouta, Panniyur-I, Perumkodi, Shimoga, Sullia, Uthirankotta, Vally, Local (Sagar), Kuthiravally (I), Thommankodi (I), Kalluvally (IV), Kurimolai, Aimpirian (I), Karimunda (II), Balankotta, Aryanmundi, Padappan, Thirthahally, Karimunda (III), Karimalligeswara, Thommankodi (II), Kodi, Kottanadan, Aimpirian (II), Karimunda (IV), Aimpirian (III), Perambaramunda, Kuthiravally (II)	Medium 5.49-2.59
	Vokkalu, Narayakodi, Kalluvally (V), Udhakere, Doddale, Kuthiravally (II), Uddakhere (II), Local (Pulpally)	2.59
Oleoresin	Kottanadan, Kumbhakkodi, Kuthiravally (I), Nilgiris, Aimpirian, Kuthiravally (II), Udhakere, Pulpally, Malabar.	14.62
	Arikottanadan, Arakulamunda, Balankotta, Ceylon, Cheriakaniyakkadan, Kalluvally (I), Kalluvally (II), Kalluvally (III), Kariakkadan, Karimunda (I), Karuvilanchy, Narayakodi, Panniyur-I, Perumkodi, TMB-II, Uthirankotta, Thirthahalli, Karimalai, Karimunda (II), Karimalligeswara, Thommankodi, Doddale, Kodikottanadan, Karimunda (III), Aryanmundi, Aimpirian, Perambaramunda, Vokkalu, Local (Sagar), Narayakodi, Kuthiravally (I), Kalluvally (IV), Thommankodi, Kalluvally (V), Thommankodi, Kalluvally (VI), Udhakere, Karimunda (IV), Kurimalai, Karimunda (V), Aryanmundi, Padappan.	14.62-8.38

Table 1 (Contd.)

Constituent	Name of the cultivar	Category and level of the constituent
	Doddigya, Chumala, Munda, Mundi, Palulouta, Perumunda, Shimoga, Sullica, Vally, Karumunda (VI).	8.38
Essential Oil	Arkottanadan, Arakulam munda, Balankotta, Kantakkadan, Kumbhakodi, Kuthiravally (I).	4.40
	Munda, Nilgiris, Parambaramunda, Kalluvally (I), Thommankodi, Karumunda (I), Ceylon, Cheriakaniyakadan, Doddigya, Kalluvally (II), Kalluvally (III), Kottanadan, Karimunda (II), Karuvilanchu, Mundi, Narayakodi, Pauliouta, Panniyur-I, Perumkodi, Perumunda, Shimoga, Sullia, TMB, Uthirankota, Vally, Karimunda (III), Kurimalai, Karimunda (IV), Karimalligeswara, Thommankodi, Kodikottanadan, Karimunda (IV), Aimpirian, Kuthiravally (I), Kuthiravally (II), Vokkalu, Local (Sagar), Narayakodi, Kuthiravally (III), Kalluvally (IV), Udhakere, Kurimalai, Aimpirian, Karimunda (IV), Malabar, Aryanmundi, Kottanadan, Padappan.	4.40-2.40
	Chumala, Kalluvally (V), Thirthahalli, Vokkalu, Doddale, Aryanmundi, Uddakhere, Pulpally (Local).	2.40

Table 2. Variation in piperine, oleoresin and essential oil in some popular pepper cultivars.

Name of the cultivar	Collections	% Piperine	Rank	Oleoresin	Rank	% Essential oil	Rank
Karimunda	(1)	6.25	H	12.17	M	4.52	H
	(2)	4.94	M	13.09	M	3.25	M
	(3)	2.94	M	8.27	L	3.20	M
	(4)	2.68	M	9.35	M	4.20	M
	(5)	3.64	M	10.07	M	3.20	M
Kalluvally	(1)	4.40	M	11.00	M	4.00	M
	(2)	4.24	M	8.80	M	3.25	M
	(3)	4.05	M	10.90	M	0.40	L
	(4)	5.40	M	8.44	L	3.00	M
	(5)	2.43	L	14.07	M	5.70	H
	(6)	2.84	M	11.82	M	2.48	M
Kuthiravally	(1)	3.01	M	12.24	M	3.18	M
	(2)	5.97	H	14.90	M	4.50	H
Piperine levels		: H - 5.49		M - 5.49 - 2.59		L - 2.59	
Oleoresin levels		: H - 14.62		M - 14.62 - 8.38		L - 8.38	
Essential oil levels		: H - 4.40		M - 4.40 - 2.40		L - 2.40	