

## EMIEAL QUALITY OF ACK AND WHITE PEPPER

ck pepper is the whole dried whereas white pepper is the form which the mesocarp has removed. The market price produce is always related to hysical and chemical quality same. More than 75 ared types of pepper are

available in India. High degree of variation is noted in the yielding ability and quality characters among the different cultivars and hence and attempt was made to evaluate the most popular cultivers for their quality characters.

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## MATERIALS AND METHODS

Fifteen popular pepper cultivars maintained by the genetic section of the National Research Centre for Spices, Calicut were evaluated for their chemical quality after processing them for black pepper and white pepper. The berry characters of these cultivars are given in Table 1.

White pepper was prepared by boiling the matured green pepper (indexed by the presence of one or two the certics) for 15 minutes followed the rolling in running water to move the outer skin (V.S. Govindarajan, 1977). The brightness of the produce was enhanced by washing with 5 percent hydrogen peroxide solution and dried in sunlight to a moisture level of 12 percent.

For evaluating the chemical quality, piperine (1, S. I. 1984) oleoresin (A.O.A.C) and essential oil (A.O.A.C) were determined. Oleoresin was extracted by cold acetone percolation of the comminuted sample and removal

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10		<del></del>			Pepper
mTable - 1. Classific	ation of pep	per cultiva	ars (Piper ni	grum) based on	· · · · · · · · · · · · · · · · · · ·
jeq berry s	ize.	100			of solvent by vacuum distillation. The oleoresin content was deter-
Large size	M	edium size	<del></del>	Small size	mined by gravimetry, Essential
(>4 25 mm)	(3	.25-4.25 r	mm)	( <b>&lt;</b> 3.25 mm)	oil was determined by hydrodisti-
Panniyur 1	Ka	rimunda		Kurielmundi	nation of pre-weighted quantity
Valiakaniakadan Vadakkan	) A	rakulamuni	da	Narayakodi	of powdered pepper using
Kuruvilanchi		attamunda			clevenger trap (lighter than water
1 Desire	Kı	ttapalackal Ithiravally		•	<sup>type</sup> ). Essential oil was computed
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	Ba	- Tallkotta			The chemical quality of pepper
eble 2. CHEMICA	AL QUALIT	Y OF WI	IITE AND B	I ACK PERRED	is indicative of suitability of the
IN SOM	AL QUALIT E SELECTE	Y OF WI-	AR CULTIV	LACK PEPPER	specific pepper for industrial
IN SOM	AL QUALIT E SELECTE	Y OF WI-	AR CULTIV	LACK PEPPER ARS	specific pepper for industrial product or byproduct utilisation.
IN SOM (EXPRES	AL QUALIT E SELECTE SED AS%D	Y OF WI-	AR CULTIV	LACK PEPPER ARS	specific pepper for industrial product or byproduct utilisation.  The results are presented in
IN SOM (EXPRES	AL QUALIT E SELECTE SED AS%D Piperine	Y OF WID POPUL RY WEIGH	AR CULTIVA	ARS	specific pepper for industrial product or byproduct utilisation. The results are presented in Table 2. Among the large berry size cultivars, piperine contents
IN SOM (EXPRES Constituent Cultivar	AL QUALIT E SELECTE SED AS%D	Y OF WID POPUL	AR CULTIVA	ARS  Essential Oil	specific pepper for industrial product or byproduct utilisation. The results are presented in Table 2. Among the large berry size cultivars, piperine content ranged from 3.15% to 3.60% in
IN SOM (EXPRES	AL QUALIT E SELECTE SED AS%D Piperine (%) W	Y OF WID POPUL RY WEIGH Oleore (%) 3.60	AR CULTIVA	Essential Oil	specific pepper for industrial product or byproduct utilisation. The results are presented in Table 2, Among the large berry size cultivars, piperine content ranged from 3.15% to 3.60% in white pepper and 3.16% to 3.00%
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EXPRES Constituent Cultivar Panniyur-1 Valliakaniakadan	AL QUALIT E SELECTE SED AS%D Piperine (%) W	Y OF WID POPUL RY WEIGH Oleore (%) 3.60 3.72 3.50	AR CULTIVA it) esin (%) 8.6 9.1 7.7	Essential Oil (%) 2.4 3.6 2.6	specific pepper for industrial product or byproduct utilisation. The results are presented in Table 2. Among the large berry size cultivars, piperine content ranged from 3.15% to 3.60% in white pepper and 3.16% to 3.09% in black pepper. Oleresin in white white pepper ranged from 7.7% to
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IN SOM (EXPRES Constituent Cultivar Panniyur-1 Valliakaniakadan Vadakkan	AL QUALITE SED AS%D  Piperine (%)  W B W B W B W B	OF WID POPUL RY WEIGH Oleore (%) 3.60 3.72 3.50 3.60 3.29 3.90	AR CULTIVA it) esin (%) 8.6 9.1 7.7	Essential Oil (%)  2.4 3.6 2.6 4.0 2.0	specific pepper for industrial product or byproduct utilisation. The results are presented in Table 2. Among the large berry size cultivars, piperine content ranged from 3.15% to 3.60% in white pepper and 3.16% to 3.09% in black pepper. Oleresin in white white pepper ranged from 7.7% to 9.7% and in black pepper the variation was 8.2% to 12.44%
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IN SOM (EXPRES  Constituent Cultivar  Panniyur-1  Valliakaniakadan  Vadakkan  Uruvilanchy  Ijimunda	Piperine (%)  W B W B W B W B W B	OF WID POPUL RY WEIGH Oleore (%) 3.60 3.72 3.50 3.60 3.29 3.90 3.15 3.16 2.93	AR CULTIVA (%) 8.6 9.1 7.7 8.2 9.1 10.6 9.7 12.4 7.8	Essential Oil (%)  2.4 3.6 2.6 4.0 2.0 3.5 3.2 4.3 2.5	specific pepper for industrial product or byproduct utilisation. The results are presented in Table 2. Among the large berry size cultivers, piperine content ranged from 3.15% to 3.60% in white pepper and 3.16% to 3.09% in black pepper. Oleresin in white white pepper ranged from 7.7% to 9.7% and in black pepper the variation was 8.2% to 12.4%. Essential oil content ranged from 2.4% to 3.2% in white pepper and 3.5% to 4.3% in black pepper.
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IN SOM (EXPRES Constituent Cultivar Panniyur-1 Valliakaniakadan Vadakkan uruvilanchy Ifimunda	Piperine (%)  W B W B W B W B W B	OF WID POPUL RY WEIGH Oleore (%) 3.60 3.72 3.50 3.60 3.29 3.90 3.15 3.16 2.93 3.86 3.47 3.82	AR CULTIVA (%) -8.6 -9.1 -7.7 -8.2 -9.1 -10.6 -9.7 -12.4 -7.8 -9.3 -10.0 -11.11	Essential Oil (%)  2.4 3.6 2.6 4.0 2.0 3.5 3.2 4.3 2.5 4.2 2.9	specific pepper for industrial product or byproduct utilisation. The results are presented in Table 2. Among the large berry size cultivars, piperine content ranged from 3.15% to 3.60% in white pepper and 3.16% to 3.09% in black pepper. Oleresin in white white pepper ranged from 7.7% to 9.7% and in black pepper the variation was 8.2% to 12.4%. Essential oil content ranged from 2.4% to 3.2% in white pepper and 3.5% to 4.3% in black pepper. The proximity of the chemical composition in white and black pepper in these group of cultivare
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IN SOM (EXPRES  Constituent Cultivar  Panniyur-1  Valliakaniakadan  Vadakkan  Viruvilanchy  Limunda  Lakulamunda  Altamunda	Piperine (%)  W B W B W B W B W B W B W B W B W B W	OF WID POPUL RY WEIGH Oleore (%) 3.60 3.72 3.50 3.60 3.29 3.90 3.15 3.16 2.93 3.86 3.47 3.82 5.85	AR CULTIVALES (%)	Essential Oil (%)  2.4 3.6 2.6 4.0 2.0 3.5 3.2 4.3 2.5 4.2 2.9 3.6 2.6 3.8 2.3	specific pepper for industrial product or byproduct utilisation. The results are presented in Table 2. Among the large berry size cultivars, piperine content ranged from 3.15% to 3.60% in white pepper and 3.16% to 3.09% in black pepper. Oleresin in white white pepper ranged from 7.7% to 9.7% and in black pepper the variation was 8.2% to 12.4%. Essential oil content ranged from 2.4% to 3.2% in white pepper and 3.5% to 4.3% in black pepper. The proximity of the chemical composition in white and black pepper in these group of cultivars indicated that removal of skin has not significantly affected the chemical quality. However the
Constituent Cultivar Panniyur-1 Vallfakaniakadan Vidakkan Uruvilanchy Ilimunda Iakulamunda	Piperine (%)  W B W B W B W B W B W B W B W B W B W	Y OF WID POPUL RY WEIGH Oleore (%) 3.60 3.72 3.50 3.60 3.29 3.90 3.15 3.16 2.93 3.86 3.47 3.82 5.85 5.94 4.50 4.80 3.2	AR CULTIVALT)  esin (%)  -8.6 9.1 7.7 8.2 9.1 10.6 9.7 12.4 7.8 9.3 10.0 11.11 6.8 8.8	Essential Oil (%)  2.4 3.6 2.6 4.0 2.0 3.5 3.2 4.3 2.5 4.2 2.9 3.6 2.6 3.8 2.3 4.6	specific pepper for industrial product or byproduct utilisation. The results are presented in Table 2. Among the large berry size cultivars, piperine content ranged from 3.15% to 3.60% in white pepper and 3.16% to 3.09% in black pepper. Oleresin in white white pepper ranged from 7.7% to 9.7% and in black pepper with variation was 8.2% to 12.4%. Essential oil content ranged from 2.4% to 3.2% in white pepper and 3.5% to 4.3% in black pepper. The proximity of the chemical composition in white and black pepper in these group of cultivars indicated that removal of skin has not significantly affected the chemical quality. However the depreciation in essential oil is
EXPRES  Constituent Cultivar  Panniyur-1  Valliakaniakadan  Vadakkan  Viruvilanchy  Ilimunda  Iskulamunda  Iskulamunda  Iskulamunda  Iskulamunda	Piperine (%)  W B W B W B W B W B W B W B W B W B W	Y OF WID POPUL RY WEIGH Oleore (%) 3.60 3.72 3.50 3.60 3.29 3.90 3.15 3.16 2.93 3.86 3.47 3.82 5.85 5.94 4.50 4.80 3.2 5.9	AR CULTIVATE)  (%)	Essential Oil (%)  2.4 3.6 2.6 4.0 2.0 3.5 3.2 4.3 2.5 4.2 2.9 3.6 2.6 3.8 2.3 4.6 2.5	specific pepper for industrial product or byproduct utilisation. The results are presented in Table 2. Among the large berry size cultivars, piperine content ranged from 3.15% to 3.60% in white pepper and 3.16% to 3.09% in black pepper. Oleresin in white white pepper ranged from 7.7% to 9.7% and in black pepper the variation was 8.2% to 12.4%. Essential oil content ranged from 2.4% to 3.2% in white pepper and 3.5% to 4.3% in black pepper. The proximity of the chemical composition in white and black pepper in these group of cultivars indicated that removal of skin has not significantly affected the chemical quality. However the depreciation in essential oil is remarkable as some of the
IN SOM (EXPRES  Constituent Cultivar  Panniyur-1  Valliakaniakadan  Vadakkan  Viruvilanchy  Limunda  Lakulamunda  Altamunda	Piperine (%)  W B W B W B W B W B W B W B W B W B W	Y OF WID POPUL RY WEIGH Oleore (%) 3.60 3.72 3.50 3.60 3.29 3.90 3.15 3.16 2.93 3.86 3.47 3.82 5.85 5.94 4.50 4.80 3.2 5.9 2.7	AR CULTIVATE)  (%)  8.6 9.1 7.7 8.2 9.1 10.6 9.7 12.4 7.8 9.3 10.0 11.11 6.8 8.8 7.5 10.2 6.3 8.9 6.4	Essential Oil (%)  2.4 3.6 2.6 4.0 2.0 3.5 3.2 4.3 2.5 4.2 2.9 3.6 2.6 3.8 2.3 4.6	specific pepper for industrial product or byproduct utilisation. The results are presented in Table 2. Among the large berry size cultivars, piperine content ranged from 3.15% to 3.60% in white pepper and 3.16% to 3.09% in black pepper. Oleresin in white white pepper ranged from 7.7% to 9.7% and in black pepper the variation was 8.2% to 12.4%. Essential oil content ranged from 2.4% to 3.2% in white pepper and 3.5% to 4.3% in black pepper. The proximity of the chemical composition in white and black pepper in these group of cultivars indicated that removal of skin has not significantly affected the chemical quality. However the depreciation in essential oil is remarkable as some of the essential oil cells are located.
IN SOM (EXPRES  Constituent Cultivar  Panniyur-1  Vallfakaniakadan  Vadakkan  Viruvilanchy  Vijimunda  Vakulamunda  Vitamunda	Piperine (%)  W B W B W B W B W B W B W B W B W B W	Y OF WID POPUL RY WEIGH Oleore (%)  3.60 3.72 3.50 3.60 3.29 3.90 3.15 3.16 2.93 3.86 3.47 3.82 5.85 5.94 4.50 4.80 3.2 5.9 2.7 3.7	AR CULTIVATE)  (%)  8.6  9.1  7.7  8.2  9.1  10.6  9.7  12.4  7.8  9.3  10.0  11.11  6.8  8.8  7.5  10.2  6.3  8.9  6.4  8.6	Essential Oil (%)  2.4 3.6 2.6 4.0 2.0 3.5 3.2 4.3 2.5 4.2 2.9 3.6 2.6 3.8 2.3 4.6 2.5 4.6 2.5 4.2 3.1	specific pepper for industrial product or byproduct utilisation. The results are presented in Table 2. Among the large berry size cultivars, piperine content ranged from 3.15% to 3.60% in white pepper and 3.16% to 3.09% in black pepper. Oleresin in white white pepper ranged from 7.7% to 9.7% and in black pepper with variation was 8.2% to 12.4%. Essential oil content ranged from 2.4% to 3.2% in white pepper and 3.5% to 4.3% in black pepper. The proximity of the chemical composition in white and black pepper in these group of cultivars indicated that removal of skin has not significantly affected the chemical quality. However the depreciation in essential oil is remarkable as some of the essential oil cells are located very close to the mesocarp. Kurnellar
Constituent Cultivar Panniyur-1 Valliakaniakadan Vadakkan Uruvilanchy Ilimunda Isakulamunda Isakulamunda Isakulamunda	Piperine (%)  W B W B W B W B W B W B W B W B W B W	Y OF WID POPUL RY WEIGH Oleore (%) 3.60 3.72 3.50 3.60 3.29 3.90 3.15 3.16 2.93 3.86 3.47 3.82 5.85 5.94 4.50 4.80 3.2 5.9 2.7	AR CULTIVATE)  (%)  8.6 9.1 7.7 8.2 9.1 10.6 9.7 12.4 7.8 9.3 10.0 11.11 6.8 8.8 7.5 10.2 6.3 8.9 6.4	Essential Oil (%)  2.4 3.6 2.6 4.0 2.0 3.5 3.2 4.3 2.5 4.2 2.9 3.6 2.6 3.8 2.3 4.6 2.5 4.5 2.2	specific pepper for industrial product or byproduct utilisation. The results are presented in Table 2. Among the large berry size cultivars, piperine content ranged from 3.15% to 3.60% in white pepper and 3.16% to 3.09% in black pepper. Oleresin in white white pepper ranged from 7.7% to 9.7% and in black pepper the variation was 8.2% to 12.4%. Essential oil content ranged from 2.4% to 3.2% in white pepper and 3.5% to 4.3% in black pepper. The proximity of the chemical composition in white and black pepper in these group of cultivars indicated that removal of skin has not significantly affected the chemical quality. However the depreciation in essential oil is remarkable as some of the essential oil cells are located.

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eino: Sa Table - 1. Classific					Pepper
berry s	ize.	per cultiva	irs (Piper 1	ilgrum) based or	
Large size	M	edium size	<u> </u>	Small size	The oleoresin content was deter- mined by gravimetry, Essential
(>4 25 mm)	(3	.25-4.25	nm)	( <b>≼</b> 3.25 mm)	oil was determined by hydrodisti-
Panniyur 1	K	rimunda		Kurielmundi	" " " " or pre-weighted quantity
Valiakaniakadan Vadakkan		rakulamun attamunda	da	Narayakodi	powdered pepper using
Kuruvilanchi	O:	ttapalackal			clevenger trap (lighter than water
	Kı	ıthiravally			type). Essential oil was computed as volume per weight.
	Ka	evanmund Iniakadan	li		
	Ne	elamundi			RESULTS AND DISCUSSION
	B8	lankotta		<u> </u>	The chemical quality of pepper
able 2. CHEMICA	AL QUALIT	Y OF WI	UTE AND	BLACK PEPPER	analisis of suitability of the
IN SOM	E SELECTE	D POPUL	AR CULTIN	NADO PEPPER	
(EVALE)	SED AS%D	RY WEIGH	T)	MIS	product or byproduct utilisation.  The results are presented in
				<u> </u>	Table 2. Among the large borre
Constituent Cultivar	Piperine	Oleore	sin	Essential Oil	Size Cultivars, piperine conte-
Panniyur-1	(%)	(%)	(%)		ranged from 3.75% to 3.60% in
	W B	3.60 3.72	8.6		winte pepper and 3.16% to 2.00%
Valliakaniakadan	w	3.50	9.1 7.7	3.6 2.6	in black pepper. Oleresin in white white pepper ranged from 7.7% to
Vadakkan	B W	3.60	8.2	4.0	9.7% and in black pepper the
	•B	3 29 3.90	9.1	2.0	variation was 8 7% to 12 4av
Wuvilanchy	W	3.15	10.6 9.7	3.5 3.2	cssential oil content ranged from
(Imunda	· B	3.16	12,4	. 37	Z.9% 10 10 3W inl.ta.
	la/				2.4% to 3.2% in white pepper and
4486	W B	2.93	7.8	4.3 2.5	3.0% to 4.3% in black pennse
lakulamunda	B W		7,8 9,3	4.3 2.5 4.2	The proximity of the chemical
	B W B	2.93 3.86 3.47 3.82	7.8 9.3 10.0 11.11	4.3 2.5 4.2 2.9	The proximity of the chemical composition in white and black pepper in these group, of cultivariant
Alamunda	B W B W	2.93 3.86 3.47 3.82 5.85	7.8 9.3 10.0 11.11 6.8	4.3 2.5 4.2	The proximity of the chemical composition in white and black pepper in these group of cultivars indicated that removal of skin has
	B W B	2.93 3.86 3.47 3.82 5.85 5.94	7.8 9.3 10.0 11.11 6.8 8.8	4.3 2.5 4.2 2.9 3.6 2.6 3.8	The proximity of the chemical composition in white and black pepper in these group of cultivars indicated that removal of skin has not significantly affected the
/ (tamunda Wapalakka)	B W B W B	2.93 3.86 3.47 3.82 5.85 5.94 4.50 4.80	7.8 9.3 10.0 11.11 6.8 8.8 7.5	4.3 2.5 4.2 2.9 3.6 2.6 3.8 2.3	The proximity of the chemical composition in white and black pepper in these group of cultivars indicated that removal of skin has not significantly affected the chemical quality. However the
Alamunda	B W B W B W	2.93 3.86 3.47 3.82 5.85 5.94 4.50 4.80 3.2	7.8 9.3 10.0 11.11 6.8 8.8 7.5 10.2 6.3	4.3 2.5 4.2 2.9 3.6 2.6 3.8 2.3 4.6	The proximity of the chemical composition in white and black pepper in these group of cultivars indicated that removal of skin has not significantly affected the chemical quality. However the depreciation in essential oil is remarkable, as a compared to the chemical quality.
/ (tamunda Wapalakka)	B W B W B	2.93 3.86 3.47 3.82 5.85 5.94 4.50 4.80 3.2 5.9	7.8 9.3 10.0 11.11 6.8 8.8 7.5 10.2 6.3 8.9	4.3 2.5 4.2 2.9 3.6 2.6 3.8 2.3 4.6 2.5 4.5	The proximity of the chemical composition in white and black pepper in these group of cultivars indicated that removal of skin has not significantly affected the chemical quality. However the depreciation in essential oil is remarkable as some of the essential oil cells are located.
/ ((Amunda i (apalakka) i (i)/avally anmuddi	B W B W B W B W	2.93 3.86 3.47 3.82 5.85 5.94 4.50 4.80 3.2	7.8 9.3 10.0 11.11 6.8 8.8 7.5 10.2 6.3 8.9 6.4	4.3 2.5 4.2 2.9 3.6 2.6 3.8 2.3 4.6 2.5 4.£	The proximity of the chemical composition in white and black pepper in these group of cultivars indicated that removal of skin has not significantly affected the chemical quality. However the depreciation in essential oil is remarkable as some of the essential oil cells are located very close to the mesocarp. Kurusilan
/ (kamunda (lapalakka) : (()/avally	B W B W B W B W	2.93 3.86 3.47 3.82 5.85 5.94 4.50 4.80 3.2 5.9 2.7 3.7 4.6	7.8 9.3 10.0 11.11 6.8 8.8 7.5 10.2 6.3 8.9 6.4 8.6 10.3	4.3 2.5 4.2 2.9 3.6 2.6 3.8 2.3 4.6 2.5 4.6 2.2 3.1	The proximity of the chemical composition in white and black pepper in these group of cultivars indicated that removal of skin has not significantly affected the chemical quality. However the depreciation in essential oil is remarkable as some of the essential oil cells are located very close to the mesocarp. Kuruvilanchi contained similar composition.
/ ((Amunda i (apalakka) i (i)/avally anmuddi	B W B W B W B W	2.93 3.86 3.47 3.82 5.85 5.94 4.50 4.80 3.2 5.9 2.7 3.7	7.8 9.3 10.0 11.11 6.8 8.8 7.5 10.2 6.3 8.9 6.4 8.6	4.3 2.5 4.2 2.9 3.6 2.6 3.8 2.3 4.6 2.5 4.£	The proximity of the chemical composition in white and black pepper in these group of cultivars indicated that removal of skin has not significantly affected the chemical quality. However the depreciation in essential oil is remarkable as some of the essential oil cells are located.

itapalackal are more or less milar. Oleoresin ranged from 3.3% to 10.0% in white pepper and 8.6% to 11.6% in black pepper Essential oil ranged from 2.0% to 2.9% in white pepper and 3.3% to 4.8% in black pepper. In all the cultivars white pepper possessed a lower essential oil, the reason for the effect is cited above. In cvs. Neelamundland Arakulamunda, the margin in essential oil content is minimum.

Cultivars whose berry size is 3.25 mm ie. Kurielmundi and Narayakodi, white and black peoper contained same piperine content Variation in oleoresin and essential oil contents in CV Kurielmundi is marginal. Essential oil in CV CV Narayakodi is 40% tess than

that in its black pepper. White pepper with the colour of Karimunda and the size of Panniyur is preferred in International market (Personal communication). Based on the colour and size of the berry. pepper cultivars found suitable for white pepper preparation are Panniyur-1 and Valiakaniakadan from the large berry cultivars Arakulamunda and Balankotta from he medium, sized cultivars. the Karimunda white pepper is very appealing, qualitatively it is slightly inferior to the other cultivars

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