Compendium of black pepper varieties

भाकृअनुप-अखिल भारतीय समन्वित मसाला अनुसंधान परियोजना ए आई सी आर पी एस

ICAR-All India Coordinated Research Project on Spices

भाकृअनुप
ICAR

ICAR-Indian Institute of Spices Research
Marikunnu P. O., Kozhikode- 673 012, Kerala, India

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Preface

Black pepper, christened as “King of spices” and “Black gold” is the most important and the most widely used spice in the world occupying a position that is supreme and unique. Black pepper is valued for its characteristic pungency and flavor and hence used extensively as a spice and a condiment in vast variety of food preparations. It is an important ingredient in traditional medicine too. Black pepper is predominantly a self-pollinated perennial, blessed with viable seed production as well as vegetative propagation. This dual advantage offers a great scope for breeders to exploit vigour as well as selection breeding. The main breeding objectives envisaged in black pepper are higher yield, improvement in quality (high bulk density, dry recovery, higher levels of essential oil, piperine and oleoresin), resistance to foot rot disease caused by *Phytophthora capsici*, resistance to nematodes, (*Radopholus similis* and *Meloidogyne incognita*), resistance to insect pests especially the pollu beetle (*Longitarsus nigripennis*), resistance to drought, shade tolerance, response to low inputs (organic breeding), suitable for high altitude and mixed cropping.

In India, more than 100 pepper cultivars are found with good inter and intra cultivar variability. Evaluation and screening of black pepper germplasm for various agronomic traits, resistance to biotic and abiotic stresses, yield and quality attributing characters have resulted in identifying sources of important genes for these characters. The breeding programmes attempted in black pepper are selection from within germplasm (inter-cultivar selection or germplasm selection), within a cultivar (intra cultivar selection or clonal selection), selection in segregating open pollinated or selfed progenies and hybridization. Eighteen improved varieties of black pepper have been released by various research organizations for cultivation. Panniyur-1, Panniyur-3 and Panniyur-8 are the hybrids evolved at the Pepper Research Station, Panniyur (Kerala Agricultural University). IISR Girimunda and IISR Malabar Excel are the two hybrids released from ICAR-Indian Institute of Spices Research, Kozhikode, Kerala.

The ability to identify varieties of black pepper is important for researchers and farmers. Selection of location specific varieties is one of the parameters for successful cultivation. Furthermore, introduction of Protection of Plant Varieties and Farmers Rights Act, 2001 has also necessitated reliable identification methods. This book provides information on identification of black pepper varieties based on shoot tip colour, leaf characteristics, spike characteristics etc., so that identity can be checked during selection and growing of black pepper varieties. True varietal identity is very important in production and multiplication of quality nucleus planting material of varieties. Photographs in this book provide excellent keys to the possible identification of released varieties of black pepper.

Compendium of Black pepper Varieties

Contents

PANNIYUR I

1. *Passport details*

1.1 Botanical name and family	*Piper nigrum* L . *Piperaceae*
1.2 Name of the varitey	Panniyur 1
1.3 Year of release	1967
1.4 Institute released the variety	Pepper Research Station, Kerala Agricultural University, Panniyur, Kerala
1.5 Acc.no.	PRS 44
1.6 Pedigree	A hybrid between Uthirankotta and Cheriyakaniakadan
1.7 Method of breeding adoted	Hybridization (Intercultivar)
1.8 Areas of adoption	All pepper growing tracts
1.9 Maturity group	Medium

2. *Morphological descriptors*

2.1 Vine height (cm)	500
2.2 Branching habit	Dimorphic
2.3 Shoot tip colour	Pale yellow
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Medium
2.7 Lateral branch habit	Erect
2.8 Lateral branch length (cm)	61.2
2.9 Number of nodes per lateral branch	13.0
2.10 Leaf petiole length(cm)	2.5
2.11 Leaf length (cm)	14.9
2.12 Leaf breadth (cm)	10.8
2.13 Leaf lamina shape	Cordate
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture	Glabrous coriaceous

3. *Qualitative characters*

3.1 Essential oil (%)	3.5
3.2 Oleoresin (%)	11.8
3.3 Piperine (%)	5.3
3.4 Dry recovery (%)	35.3

4. *Reproductive characters*

4.1 Spike orientation	Pendant
4.2 Spike shape	Filiform
4.3 Young spike colour	Greenish yellow
4.4 Spike composition (%)	Bisexual : 99.92 Female : 0.07 Male : 0.01
4.5 Spike length (cm)	17
4.6 Peduncle length (cm)	1.7
4.7 Number of spikes/lateral branch	7.0
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	96.0
4.14 Number of developed fruits per spike	86.0
4.15 Mean number of berries per ten spikes	125
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	155
4.18 1000 fruit volume (cc)	145
4.19 Mean yield per vine (fresh weight)	2.2 kg green pepper
4.20 Average yield per ha (dry pepper)	3850 kg
4.21 Potential yield per ha	>8800 kg

5. *Reaction to major diseases and insect pests*

5.1 *Phytophthora* foot rot (*Phytophthora*	Susceptible
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne*	Susceptible
5.5 Scale insects (*Lepidosaphes* sp. &	Susceptible
5.6 Leaf gall thrips	Susceptible

6. *Reaction to abiotic stress*

6.1 Drought	Susceptible
6.2 Shade	Susceptible

7. *Specific recommendations*

Use only clonal planting material. The package of practices recommended by Kerala Agricultural University is to be followed. Yield of Panniyur 1 is poor in heavily shaded conditions.

8. *Diagnostic features*

Shoot tip pale yellow and young spikes greenish yellow in colour. Bears very long spikes (17 cm) with bold berries. Leaves large and heart shaped. High oleoresin content.

PANNIYUR 2

1. *Passport details*

1.1 Botanical name and family	*Piper nigrum* L. *Piperaceae*
1.2 Name of the varitey	Panniyur 2
1.3 Year of release	1991
1.4 Institute released the variety	Pepper Research Station, Kerala Agricultural University, Panniyur, Kerala
1.5 Acc.no.	PRS 114
1.6 Pedigree	Selection from open pollinated progeny of cv. Balankotta
1.7 Method of breeding adopted	Selection
1.8 Areas of adoption	All pepper growing tracts of Kerala
1.9 Maturity group	Late

2. *Morphological descriptors*

2.1 Vine height (cm)	475.0
2.2 Branching habit	Dimorphic
2.3 Shoot tip colour	Pale purple
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Medium
2.7 Lateral branch habit	Horizontal
2.8 Lateral branch length (cm)	49.0
2.9 Number of nodes per lateral branch	29.0
2.10 Leaf petiole length (cm)	1.3
2.11 Leaf length (cm)	14.9
2.12 Leaf breadth (cm)	10.8
2.13 Leaf lamina shape	Cordate
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture	Glabrous coriaceous

3. *Qualitative characters*

3.1 Essential oil (%)	3.4
3.2 Oleoresin (%)	10.9
3.3 Piperine (%)	6.6
3.4 Dry recovery (%)	35.8

4. *Reproductive characters*

4.1 Spike orientation	Pendant
4.2 Spike shape	Filiform
4.3 Young spike colour	Green
4.4 Spike composition (%)	Bisexual : 96.7 Female : 3.3 Male : 0.0
4.5 Spike length (cm)	12.3
4.6 Peduncle length (cm)	1.1
4.7 Number of spikes/lateral branch	14.0
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	74.2
4.14 Number of developed fruits per spike	82.0
4.15 Mean number of berries per ten spikes	45
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	127
4.18 1000 fruit volume (cc)	120
4.19 Mean yield per vine (fresh weight)	4.5 Kg green pepper
4.20 Average yield per ha (dry pepper)	2570 Kg
4.21 Potential yield per ha	>3313 Kg

5. *Reaction to major diseases and insect pests*

5.1 *Phytophthora* foot rot (*Phytophthora capsici*)	Susceptible
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Susceptible
5.5 Scale insects (*Lepidosaphes* sp. & *Aspidiotus* sp.)	Susceptible
5.6 Leaf gall thrips	Susceptible

6. *Reaction to aboitic stress*

6.1 Drought	Susceptible
6.2 Shade	Susceptible

7. *Specific recommendations*

Use only clonal planting material. The package of practices recommended by Kerala Agricultural University is to be followed. Strict plant protection measures recommended.

8. *Diagnostic features*

Shoot tip colour pale purple. Leaves show faint network of yellow and green patches.

PANNIYUR 3

3

1. *Passport details*

1.1 Botanical name and family	*Piper nigrum* L. Piperaceae
1.2 Name of the varitey	Panniyur 3
1.3 Year of release	1991
1.4 Institute released the variety	Pepper Research Station, Kerala Agricultural University, Panniyur, Kerala
1.5 Acc.no.	PRS 115
1.6 Pedigree	Hybrid (Cul.331) between Uthirankotta and Cheriyakaniakadan
1.7 Method of breeding adoted	Hybridization
1.8 Areas of adoption	All pepper growing tracts of Kerala
1.9 Maturity group	Late

2. *Morphological descriptors*

2.1 Vine height (cm)	550
2.2 Branching habit	Dimorphic
2.3 Shoot tip colour	Light purple
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Many
2.7 Lateral branch habit	Horizontal
2.8 Lateral branch length (cm)	51.0
2.9 Number of nodes per lateral branch	32.0
2.10 Leaf petiole length (cm)	1.3
2.11 Leaf length (cm)	12.6
2.12 Leaf breadth (cm)	9.4
2.13 Leaf lamina shape	Roughly cordate
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture	Glabrous coriaceous

3. *Qualitative characters*

3.1 Essential oil (%)	3.12
3.2 Oleoresin (%)	12.7
3.3 Piperine (%)	5.2
3.4 Dry recovery (%)	

4. *Reproductive characters*

4.1 Spike orientation	Pendant
4.2 Spike shape	Filiform
4.3 Young spike colour	Green
4.4 Spike composition (%)	Bisexual : 99.9 Female : 0.1 Male : 0.0
4.5 Spike length (cm)	14.5
4.6 Peduncle length (cm)	0.98
4.7 Number of spikes/lateral branch	15.0
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	89
4.14 Number of developed fruits per spike	68
4.15 Mean number of berries per ten spikes	68
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	153
4.18 1000 fruit volume (cc)	137
4.19 Mean yield per vine (fresh weight)	4.4 Kg green pepper
4.20 Average yield per ha (dry pepper)	>1953 Kg
4.21 Potential yield per ha	>3269 Kg

5.*Reaction to major diseases and insect pests*

5.1 *Phytophthora* foot rot (*Phytophthora capsici*)	Susceptible
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Susceptible
5.5 Scale insects (*Lepidosaphes* sp. & *Aspidiotus* sp.)	Susceptible
5.6 Leaf gall thrips	Susceptible

6. *Reaction to aboitic stress*

6.1 Drought	Susceptible
6.2 Shade	Susceptible

7. *Specific recommendations*

Use only clonal planting material. The package of practices recommended by Kerala Agricultural University are to be followed. Strict plant protection measures recommended.

8. *Diagnostic features*

A variant with very long spikes, bold berries and high oleoresin content. Leaf margins mostly wavy. Prefers open conditions.

PANNIYUR 4

1. *Passport details*

1.1 Botanical name and family	*Piper nigrum* L. Piperaceae
1.2 Name of the varitey	Panniyur 4
1.3 Year of release	1991
1.4 Institute released the variety	Pepper Research Station, Kerala Agricultural University, Panniyur, Kerala
1.5 Acc.no.	PRS 33
1.6 Pedigree	Clonal selection from the cultivar
1.7 Method of breeding adoted	Clonal selection
1.8 Areas of adoption	All pepper growing tracts of Kerala
1.9 Maturity group	Late

2. *Morphological descriptors*

2.1 Vine height (cm)	550
2.2 Branching habit	Dimorphic
2.3 Shoot tip colour	Dark purple
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capasity	Many
2.7 Lateral branch habit	Horizontal
2.8 Lateral branch length (cm)	38 cm
2.9 Number of nodes per lateral branch	6
2.10 Leaf petiole length (cm)	1.27
2.11 Leaf length (cm)	13.6
2.12 Leaf breadth (cm)	10.3
2.13 Leaf lamina shape	Cordate
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture	Glabrous coriaceous

3. *Qualitative characters*

3.1 Essential oil (%)	3.12
3.2 Oleoresin (%)	11.3
3.3 Piperine (%)	4.4
3.4 Dry recovery (%)	34.7

4. *Reproductive characters*

4.1 Spike orientation	Pendant
4.2 Spike shape	Filiform
4.3 Young spike colour	Green
4.4 Spike composition (%)	Bisexual : 96.4 Female : 3.6 Male : 0.0
4.5 Spike length (cm)	9.34
4.6 Peduncle length (cm)	
4.7 Number of spikes/lateral branch	9.7
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	85.7
4.14 Number of developed fruits per spike	38
4.15 Mean number of berries per ten spikes	38.0
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	116
4.18 1000 fruit volume (cc)	112
4.19 Mean yield per vine (fresh weight)	2.3 Kg green pepper
4.20 Average yield per ha (dry pepper)	>1277 Kg
4.21 Potential yield per ha	>2450 Kg

5.*Reaction to major diseases and insect pests*

5.1 *Phytophthora* foot rot (*Phytophthora capsici*)	Susceptible
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Susceptible
5.5 Scale insects (*Lepidosaphes* sp. & *Aspidiotus* sp.)	Susceptible
5.6 Leaf gall thrips	Susceptible

6. *Reaction to aboitic stress*

6.1 Drought	Susceptible
6.2 Shade	Partial shade tolerant

7. *Specific recommendations*

Use only clonal planting material. The package of practices recommended by Kerala Agricultural University are to be followed. Strict plant protection measures recommended.

8. *Diagnostic features*

Small to medium sized heart shaped leaves. Shoot tip is dark purple. Performs well under adverse climatic conditions including partial shade, stable yielder. It comes to harvest late in the seasons.

PANNIYUR 5

1. Passport details

1.1 Botanical name and family	*Piper nigrum* L. Piperaceae
1.2 Name of the varitey	Panniyur 5
1.3 Year of release	1996
1.4 Institute released the variety	Pepper Research Station, Kerala Agricultural University, Panniyur, Kerala
1.5 Acc.no.	PRS 116
1.6 Pedigree	Clonal selection from open pollinated progeny of Perumkodi (Cul.239)
1.7 Method of breeding adoted	Clonal selection
1.8 Areas of adoption	All pepper growing tracts of Kerala
1.9 Maturity group	Late

2. Morphological descriptors

2.1 Vine height (cm)	478.0
2.2 Branching habit	Dimorphic
2.3 Shoot tip colour	Light purple
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Many
2.7 Lateral branch habit	Hanging
2.8 Lateral branch length (cm)	51.0
2.9 Number of nodes per lateral branch	29.0
2.10 Leaf petiole length (cm)	1.5
2.11 Leaf length (cm)	15.2
2.12 Leaf breadth (cm)	8.5
2.13 Leaf lamina shape	Ovate
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture	Glabrous coriaceous

3. Qualitative characters

3.1 Essential oil (%)	3.8
3.2 Oleoresin (%)	12.33
3.3 Piperine (%)	5.3
3.4 Dry recovery (%)	35.71%

4. Reproductive characters

4.1 Spike orientation	Pendant
4.2 Spike shape	Filiform
4.3 Young spike colour	Greenish yellow
4.4 Spike composition (%)	Bisexual : 70-75 Female : 5-10 Male : 5-10
4.5 Spike length (cm)	13.10
4.6 Peduncle length (cm)	2.1
4.7 Number of spikes/lateral branch	12.0
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	86
4.14 Number of developed fruits per spike	55
4.15 Mean number of berries per ten spikes	51
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	110
4.18 1000 fruit volume (cc)	104
4.19 Mean yield per vine (fresh weight)	2.3 Kg green pepper
4.20 Average yield per ha (dry pepper)	>1100 Kg
4.21 Potential yield per ha	>2248 Kg

5. Reaction to major diseases and insect pests

5.1 Phytophthora foot rot (*Phytophthora capsici*)	Susceptible
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Susceptible
5.5 Scale insects (*Lepidosaphes* sp. & *Aspidiotus* sp.)	Susceptible
5.6 Leaf gall thrips	Susceptible

6. Reaction to aboitic stress

6.1 Drought	Susceptible
6.2 Shade	Tolerant

7. Specific recommendations

Use only clonal planting material. The package of practices recommended by Kerala Agricultural University is to be followed. Strict plant protection measures recommended.

8. Diagnostic features

Tolerant to nursery diseases and shade.Large oval leaves. Long and protoandrous spikes favouring high berry setting. Suitable for both monocropping and mixed cropping systems.

PANNIYUR 6

1. *Passport details*

1.1 Botanical name and family	*Piper nigrum* L. Piperaceae
1.2 Name of the varitey	Panniyur 6
1.3 Year of release	1999
1.4 Institute released the variety	Pepper Research Station, Kerala Agricultural University, Panniyur, Kerala
1.5 Acc.no.	PRS 22
1.6 Pedigree	Clonal selection from the local cultivar- Karimunda II
1.7 Method of breeding adoted	Clonal selection
1.8 Areas of adoption	All pepper growing tracts of
1.9 Maturity group	Medium

2. *Morphological descriptors*

2.1 Vine height (cm)	475.0
2.2 Branching habit	Dimorphic
2.3 Shoot tip colour	Light purple
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Many
2.7 Lateral branch habit	Horizontal
2.8 Lateral branch length (cm)	49.0
2.9 Number of nodes per lateral branch	29.0
2.10 Leaf petiole length (cm)	1.3
2.11 Leaf length (cm)	13.6
2.12 Leaf breadth (cm)	10.3
2.13 Leaf lamina shape	Ovate
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture	Glabrous coriaceous

3. *Qualitative characters*

3.1 Essential oil (%)	1.33
3.2 Oleoresin (%)	8.27
3.3 Piperine (%)	4.94
3.4 Dry recovery (%)	32.9

4. *Reproductive characters*

4.1 Spike orientation	Pendant
4.2 Spike shape	Filiform
4.3 Young spike colour	Green
4.4 Spike composition (%)	Bisexual : 99.0 Female : 0.5 Male : 0.5
4.5 Spike length (cm)	12.2
4.6 Peduncle length (cm)	1.1
4.7 Number of spikes/lateral branch	14.0
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	99
4.14 Number of developed fruits per spike	53
4.15 Mean number of berries per ten spikes	53
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	130
4.18 1000 fruit volume (cc)	120
4.19 Mean yield per vine (fresh weight)	6.6 Kg green pepper
4.20 Average yield per ha (dry pepper)	>2127 Kg
4.21 Potential yield per ha	>3360 Kg

5.*Reaction to major diseases and insect pests*

5.1 *Phytophthora* foot rot (*Phytophthora capsici*)	Not susceptible
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Susceptible
5.5 Scale insects (*Lepidosaphes* sp. & *Aspidiotus* sp.)	Susceptible
5.6 Leaf gall thrips	Susceptible Not susceptible

6. *Reaction to aboitic stress*

6.1 Drought	Tolerant
6.2 Shade	Partial

7. *Specific recommendations*

Kerala Agricultural University package of practices is to be followed Strict plant protection measures recommended.

8. *Diagnostic features*

Vigorous vine with regular bearer. Performs well under adverse climatic conditions. More number of spikes per unit area, close setting with bold attractive berries.

PANNIYUR 7

7

1. *Passport details*

1.1 Botanical name and family	*Piper nigrum* L. Piperaceae
1.2 Name of the varitey	Panniyur 7
1.3 Year of release	2000
1.4 Institute released the variety	Pepper Research Station, Kerala Agricultural University, Panniyur, Kerala
1.5 Acc.no.	PRS 117
1.6 Pedigree	Clonal selection from open pollinated progeny of Kalluvally
1.7 Method of breeding adoted	Clonal selection
1.8 Areas of adoption	All pepper growing tracts of Kerala,
1.9 Maturity group	Medium

2. *Morphological descriptors*

2.1 Vine height (cm)	530
2.2 Branching habit	dimorphic
2.3 Shoot tip colour	Light purple
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Many
2.7 Lateral branch habit	erect
2.8 Lateral branch length (cm)	46.6
2.9 Number of nodes per lateral branch	5.8
2.10 Leaf petiole length (cm)	2.6
2.11 Leaf length (cm)	12.9
2.12 Leaf breadth (cm)	6.5
2.13 Leaf lamina shape	Roughly cordate
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture	Glabrous coriaceous

3. *Qualitative characters*

3.1 Essential oil (%)	1.5
3.2 Oleoresin (%)	10.6
3.3 Piperine (%)	5.57
3.4 Dry recovery (%)	33.5

4. *Reproductive characters*

4.1 Spike orientation	Pendant
4.2 Spike shape	Filiform
4.3 Young spike colour	Green
4.4 Spike composition (%)	Bisexual : 98.0 Female : 1.5 Male : 0.5
4.5 Spike length (cm)	19.4
4.6 Peduncle length (cm)	0.5
4.7 Number of spikes/lateral branch	3
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	92
4.14 Number of developed fruits per spike	13
4.15 Mean number of berries per ten spikes	133
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	150
4.18 1000 fruit volume (cc)	140
4.19 Mean yield per vine (fresh weight)	4.2 Kg green pepper
4.20 Average yield per ha (dry pepper)	1410 Kg
4.21 Potential yield per ha	2770 Kg

5. *Reaction to major diseases and insect pests*

5.1 Phytophthora foot rot (*Phytophthora capsici*)	Not susceptible
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Susceptible
5.5 Scale insects (*Lepidosaphes* sp. & *Aspidiotus* sp.)	Susceptible
5.6 Leaf gall thrips	Susceptible to pests

6. *Reaction to aboitic stress*

6.1 Drought	Partial tolerant
6.2 Shade	Tolerant

7. *Specific recommendations*

Use only clonal planting material. The package of practices recommended by Kerala Agricultural University is to be followed.

8. *Diagnostic features*

Long and protoandrous spikes (16-24 cm) favouring high berry setting. Leaves roughly cordate and mostly folded inwards. Suitable for both monocropping and mixed crop in coconut/arecanut gardens and tolerate, adverse climatic conditions, suitable for open and shaded conditions.

PANNIYUR 8

1. *Passport details*

1.1 Botanical name and family	*Piper nigrum* L. Piperaceae
1.2 Name of the varitey	Panniyur 8
1.3 Year of release	2010
1.4 Institute released the variety	Pepper Research Station, Kerala Agricultural University, Panniyur, Kerala
1.5 Acc.no.	HB.20052
1.6 Pedigree	A hybrid between Panniyur 6 and Panniyur-5
1.7 Method of breeding adoted	Hybridization
1.8 Areas of adoption	All pepper growing tracts of Kerala
1.9 Maturity group	Late

2. *Morphological descriptors*

2.1 Vine height (cm)	
2.2 Branching habit	Dimorphic
2.3 Shoot tip colour	Light purple
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Many
2.7 Lateral branch habit	Horizontal
2.8 Lateral branch length (cm)	49.0
2.9 Number of nodes per lateral branch	29.0
2.10 Leaf petiole length (cm)	1.5
2.11 Leaf length (cm)	15.0
2.12 Leaf breadth (cm)	8.0
2.13 Leaf lamina shape	Ovate
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture	Glabrous coriaceous

3. *Qualitative characters*

3.1 Essential oil (%)	1.17
3.2 Oleoresin (%)	12.17
3.3 Piperine (%)	5.68
3.4 Dry recovery (%)	37.0

4. *Reproductive characters*

4.1 Spike orientation	Pendant
4.2 Spike shape	Filiform
4.3 Young spike colour	Greenish yellow
4.4 Spike composition (%)	Bisexual : 99.5 Female : 0 Male : 0.5
4.5 Spike length (cm)	13
4.6 Peduncle length (cm)	
4.7 Number of spikes/lateral branch	7
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	90-95
4.14 Number of developed fruits per spike	56.6
4.15 Mean number of berries per ten spikes	56.6
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	120
4.18 1000 fruit volume (cc)	110
4.19 Mean yield per vine (fresh weight)	4.2 Kg green pepper
4.20 Average yield per ha (dry pepper)	3500 Kg
4.21 Potential yield per ha	3000 Kg

5. *Reaction to major diseases and insect pests*

5.1 *Phytophthora* foot rot (*Phytophthora capsici*)	Tolerant
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Susceptible
5.5 Scale insects (*Lepidosaphes* sp. & *Aspidiotus* sp.)	Susceptible
5.6 Leaf gall thrips	Susceptible Tolerant

6. *Reaction to aboitic stress*

6.1 Drought	Tolerant
6.2 Shade	Tolerant

7. *Specific recommendations*

Use only clonal planting material. The package of practices recommended by Kerala Agricultural University is to be followed.

8. *Diagnostic features*

Early spiking, more sublateral branches producing more number of spikes which are having attractive dark glossy green colour and compact setting of berries.

PANNIYUR 9

9

1. *Passport details*

1.1 Botanical name and family	*Piper nigrum* L. Piperaceae
1.2 Name of the varitey	Panniyur 9
1.3 Year of release	2016
1.4 Institute released the variety	Pepper Research Station, Kerala Agricultural University, Panniyur, Kerala
1.5 Acc.no.	Cul 5308
1.6 Pedigree	Open pollinated progeny of Panniyur 3
1.7 Method of breeding adoted	Open pollinated progeny selection
1.8 Areas of adoption	All pepper growing tracts of Kerala
1.9 Maturity group	Medium

2. *Morphological descriptors*

2.1 Vine height (cm)	560
2.2 Branching habit	Dimorphic
2.3 Shoot tip colour	Greenish yellow
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Many
2.7 Lateral branch habit	Horizontal
2.8 Lateral branch length (cm)	28.0
2.9 Number of nodes per lateral branch	4
2.10 Leaf petiole length (cm)	1.7
2.11 Leaf length (cm)	15.6
2.12 Leaf breadth (cm)	9.7
2.13 Leaf lamina shape	Ovate lanceolate
2.14 Leaf margin	Mostly even occasionally wavy
2.15 Type of veining	Campylodromous
2.16 Leaf texture	Glabrous coriaceous

3. *Qualitative characters*

3.1 Essential oil (%)	5
3.2 Oleoresin (%)	12.71
3.3 Piperine (%)	6.11
3.4 Dry recovery (%)	40.0

4. *Reproductive characters*

4.1 Spike orientation	Prostrate
4.2 Spike shape	Filiform
4.3 Young spike colour	Green
4.4 Spike composition (%)	Bisexual : 98 Female : 2 Male : 0.5
4.5 Spike length (cm)	10.2
4.6 Peduncle length (cm)	1.5
4.7 Number of spikes/lateral branch	7
4.8 Flower arrangement	Free
4.9 Number of stamens	2
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	90
4.14 Number of developed fruits per spike	90
4.15 Mean number of berries per ten spikes	900
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	150
4.18 1000 fruit volume (cc)	149
4.19 Mean yield per vine (fresh weight)	7.2 Kg green pepper
4.20 Average yield per ha (dry pepper)	3150 Kg
4.21 Potential yield per ha	3.24 Kg

5. *Reaction to major diseases and insect pests*

5.1 *Phytophthora* foot rot (*Phytophthora capsici*)	Tolerant
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Susceptible
5.5 Scale insects (*Lepidosaphes* sp. & *Aspidiotus* sp.)	Susceptible
5.6 Leaf gall thrips	Susceptible
5.7 Pollu beetle	Tolerant

6. *Reaction to aboitic stress*

6.1 Drought	Tolerant
6.2 Shade	Tolerant

7. *Specific recommendations*

Use only clonal planting material. The package of practices recommended by Kerala Agricultural University is to be followed.

8. *Diagnostic features*

Mature leaf tips curved downwards. The spikes are medium long with compact setting and medium sized berries. The variety is tolerant to drought condition. Promising variety with better performance in hilly tracts.

1. *Passport details*

1.1 Botanical name and family	*Piper nigrum* L. Piperaceae
1.2 Name of the varitey	Sreekara
1.3 Year of release	1990
1.4 Institute released the variety	Indian Institute of Spices Research, Marikunnu P.O, Kozhikode, Kerala
1.5 Acc.no.	NRCS KS-14
1.6 Pedigree	Clonal selection from Karimunda
1.7 Method of breeding adoted	Clonal selection
1.8 Areas of adoption	All pepper growing tracts of
1.9 Maturity group	Medium

2. *Morphological descriptors*

2.1 Vine height (cm)	460
2.2 Branching habit	Polymorphic
2.3 Shoot tip colour	Greenish yellow
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Many
2.7 Lateral branch habit	Erect
2.8 Lateral branch length (cm)	61.2
2.9 Number of nodes per lateral branch	13.0
2.10 Leaf petiole length (cm)	2.5
2.11 Leaf length (cm)	11.6
2.12 Leaf breadth (cm)	6.2
2.13 Leaf lamina shape	Ovate
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture	Glabrous coriaceous

3. *Qualitative characters*

3.1 Essential oil (%)	7.0
3.2 Oleoresin (%)	13.0
3.3 Piperine (%)	5.1
3.4 Dry recovery (%)	35.0

4. *Reproductive characters*

4.1 Spike orientation	Pendant
4.2 Spike shape	Filiform
4.3 Young spike colour	Greenish yellow
4.4 Spike composition (%)	Bisexual : 98.0 Female : 1.0 Male : 1.0
4.5 Spike length (cm)	8.6
4.6 Peduncle length (cm)	1.7
4.7 Number of spikes/lateral branch	7.0
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	63.0
4.14 Number of developed fruits per spike	61
4.15 Mean number of berries per ten spikes	61
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	108
4.18 1000 fruit volume (cc)	106
4.19 Mean yield per vine (fresh weight)	4.8 kg green pepper
4.20 Average yield per ha (dry pepper)	2677 Kg
4.21 Potential yield per ha	>4200 Kg

5. *Reaction to major diseases and insect pests*

5.1 *Phytophthora* foot rot (*Phytophthora capsici*)	Susceptible
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Susceptible
5.5 Scale insects (*Lepidosaphes sp. & Aspidiotus sp.*)	Susceptible
5.6 Leaf gall thrips	Susceptible

6. *Reaction to aboitic stress*

6.1 Drought	Tolerant
6.2 Shade	Tolerant

7. *Specific recommendations*

Use only clonal planting material. The package of practices recommended by ICAR- IISR is to be followed.

8. *Diagnostic features*

Adaptable to various climatic conditions and suitable for intercropping & high elevations.Gives high quality pepper.

1. Passport details

1.1 Botanical name and family	*Piper nigrum* L. Piperaceae
1.2 Name of the varitey	Subhakara
1.3 Year of release	1990
1.4 Institute released the variety	Indian Institute of Spices Research, Marikunnu P.O, Kozhikode, Kerala
1.5 Acc.no.	NRCS KS-27
1.6 Pedigree	Clonal selection from Karimunda
1.7 Method of breeding adoted	Clonal selection
1.8 Areas of adoption	All pepper growing tracts of
1.9 Maturity group	Medium

2. Morphological descriptors

2.1 Vine height (cm)	400
2.2 Branching habit	Polymorphic
2.3 Shoot tip colour	Greenish yellow
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Many
2.7 Lateral branch habit	Erect
2.8 Lateral branch length (cm)	44
2.9 Number of nodes per lateral branch:	14
2.10 Leaf petiole length (cm)	1.3
2.11 Leaf length (cm)	12.3
2.12 Leaf breadth (cm)	6.5
2.13 Leaf lamina shape	Ovate
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture	Glabrous coriaceous

3. Qualitative characters

3.1 Essential oil (%)	6.0
3.2 Oleoresin (%)	12.4
3.3 Piperine (%)	3.4
3.4 Dry recovery (%)	35.0

4. Reproductive characters

4.1 Spike orientation	
4.2 Spike shape	Filiform
4.3 Young spike colour	Greenish yellow
4.4 Spike composition (%)	Bisexual : 99.0 Female : 0.5 Male : 0.5
4.5 Spike length (cm)	7.7
4.6 Peduncle length (cm)	1.7
4.7 Number of spikes/lateral branch	7.0
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	68.0
4.14 Number of developed fruits per spike	63
4.15 Mean number of berries per ten spikes	63
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	103
4.18 1000 fruit volume (cc)	100
4.19 Mean yield per vine (fresh weight)	4.2 Kg green pepper
4.20 Average yield per ha (dry pepper)	2352 Kg
4.21 Potential yield per ha	>4487 Kg

5. Reaction to major diseases and insect pests

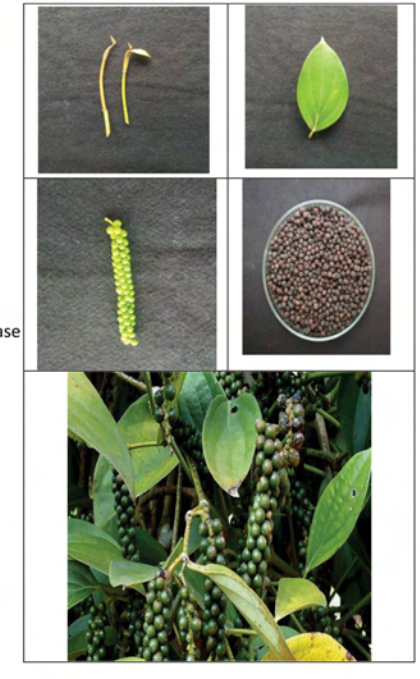
5.1 *Phytophthora* foot rot (*Phytophthora capsici*)	Susceptible
5.2 *Colletotrichum* leaf spot	
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Susceptible
5.5 Scale insects (*Lepidosaphes* sp. & *Aspidiotus* sp.)	Susceptible
5.6 Leaf gall thrips	Susceptible

6. Reaction to aboitic stress

6.1 Drought	Tolerant
6.2 Shade	Tolerant

7. Specific recommendations

Use only clonal planting material. The package of practices recommended by ICAR- IISR is to be followed.



8. Diagnostic features

A selection with wide adaptability, Suitable for intercropping and high elevations.

1. *Passport details*

1.1 Botanical name and family	*Piper nigrum* L. Piperaceae
1.2 Name of the varitey	Panchami
1.3 Year of release	2001
1.4 Institute released the variety	Indian Institute of Spices Research, Marikunnu P.O, Kozhikode, Kerala
1.5 Acc.no.	Coll-856
1.6 Pedigree	Clonal selection from Aimpiriyan
1.7 Method of breeding adoted	Clonal selection
1.8 Areas of adoption	All pepper growing tracts of Kerala
1.9 Maturity group	Medium

2. *Morphological descriptors*

2.1 Vine height (cm)	500
2.2 Branching habit	Polymorphic
2.3 Shoot tip colour	Greenish yellow
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Many
2.7 Lateral branch habit	Erect
2.8 Lateral branch length (cm)	
2.9 Number of nodes per lateral branch	
2.10 Leaf petiole length (cm)	
2.11 Leaf length (cm)	14.5
2.12 Leaf breadth (cm)	8.5
2.13 Leaf lamina shape	Ovate
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture	Glabrous coriaceous

3. *Qualitative characters*

3.1 Essential oil (%)	3.4
3.2 Oleoresin (%)	12.5
3.3 Piperine (%)	4.7
3.4 Dry recovery (%)	34.0

4. *Reproductive characters*

4.1 Spike orientation	Pendant
4.2 Spike shape	Filiform
4.3 Young spike colour	Greenish yellow
4.4 Spike composition (%)	Bisexual : 95..5 Female : 4.0 Male : 0.5
4.5 Spike length (cm)	11.2
4.6 Peduncle length (cm)	1.3
4.7 Number of spikes/lateral branch	11.3
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	82
4.14 Number of developed fruits per spike	84
4.15 Mean number of berries per ten spikes	84
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	107
4.18 1000 fruit volume (cc)	108
4.19 Mean yield per vine (fresh weight)	5.2 Kg green pepper
4.20 Average yield per ha (dry pepper)	2828 Kg
4.21 Potential yield per ha	6528 Kg

5. *Reaction to major diseases and insect pests*

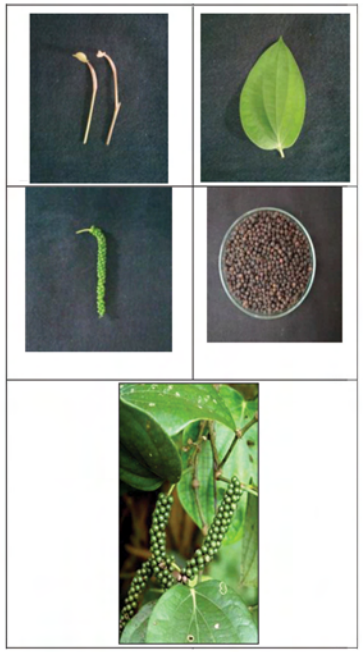
5.1 *Phytophthora* foot rot (*Phytophthora capsici*)	Susceptible
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Susceptible
5.5 Scale insects (*Lepidosaphes* sp. & *Aspidiotus* sp.)	Susceptible
5.6 Leaf gall thrips	Susceptible

6. *Reaction to aboitic stress*

6.1 Drought	moderately tolerant
6.2 Shade	tolerant

7. *Specific recommendations*

Use only clonal planting material. The package of practices recommended by ICAR-IISR is to be followed.



8. *Diagnostic features*

A high yielding variety with excellent fruit set and spike appeared as twisted. Suitable for cultivation in high elevation.

1. *Passport details*

1.1 Botanical name and family	*Piper nigrum* L. Piperaceae
1.2 Name of the varitey	Pournami
1.3 Year of release	2001
1.4 Institute released the variety	Indian Institute of Spices Research, Marikunnu P.O, Kozhikode, Kerala
1.5 Acc.no.	NRCS-812
1.6 Pedigree	Clonal selection from germplasm
1.7 Method of breeding adoted	Clonal selection
1.8 Areas of adoption	All pepper growing tracts of Kerala
1.9 Maturity group	Medium

2. *Morphological descriptors*

2.1 Vine height (cm)	500
2.2 Branching habit	Polymorphic
2.3 Shoot tip colour	Greenish yellow
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Many
2.7 Lateral branch habit	Erect
2.8 Lateral branch length (cm)	52.6
2.9 Number of nodes per lateral branch	28.4
2.10 Leaf petiole length (cm)	1.46
2.11 Leaf length (cm)	15.6
2.12 Leaf breadth (cm)	8.5
2.13 Leaf lamina shape	Ovate- lanceolate
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture	Glabrous coriaceous

3. *Qualitative characters*

3.1 Essential oil (%)	3.5
3.2 Oleoresin (%)	11.8
3.3 Piperine (%)	5.3
3.4 Dry recovery (%)	35.3

4. *Reproductive characters*

4.1 Spike orientation	Pendant
4.2 Spike shape	Filiform
4.3 Young spike colour	Greenish yellow
4.4 Spike composition (%)	Bisexual : 84.0 Female : 15.0 Male : 1.0
4.5 Spike length (cm)	12.0
4.6 Peduncle length (cm)	1.6
4.7 Number of spikes/lateral branch	10.4
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	68.0
4.14 Number of developed fruits per spike	
4.15 Mean number of berries per ten spikes	79
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	128
4.18 1000 fruit volume (cc)	130
4.19 Mean yield per vine (fresh weight)	4.7 Kg green pepper
4.20 Average yield per ha (dry pepper)	2333 Kg
4.21 Potential yield per ha	5356 Kg

5. *Reaction to major diseases and insect pests*

5.1 *Phytophthora* foot rot (*Phytophthora capsici*)	Susceptible
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Tolerant
5.5 Scale insects (*Lepidosaphes* sp. & *Aspidiotus* sp.)	Susceptible
5.6 Leaf gall thrips	Susceptible

6. *Reaction to aboitic stress*

6.1 Drought	Susceptible
6.2 Shade	Tolerant

7. *Specific recommendations*

Use only clonal planting material. The package of practices recommended by ICAR- IISR is to be followed.

8. *Diagnostic features*

A moderately high yielding variety with high oleoresin content.
Suitable for intercropping with arecanut, banana etc.

1. *Passport details*

1.1 Botanical name and family	*Piper nigrum* L. Piperaceae
1.2 Name of the varitey	IISR Thevam
1.3 Year of release	2006
1.4 Institute released the variety	Indian Institute of Spices Research, Marikunnu P.O, Kozhikode, Kerala
1.5 Acc.no.	IISR Coll.1041
1.6 Pedigree	Clonal selection from cv. Thevanmundi
1.7 Method of breeding adoted	Clonal selection
1.8 Areas of adoption	All pepper growing tracts of Kerala
1.9 Maturity group	Medium

2. *Morphological descriptors*

2.1 Vine height (cm)	450
2.2 Branching habit	Polymorphic
2.3 Shoot tip colour	Greenish yellow
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Many
2.7 Lateral branch habit	Erect
2.8 Lateral branch length (cm)	
2.9 Number of nodes per lateral branch	13.0
2.10 Leaf petiole length (cm)	2.5
2.11 Leaf length (cm)	14.2
2.12 Leaf breadth (cm)	7.0
2.13 Leaf lamina shape	Ovate elliptic
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture	Glabrous coriaceous

3. *Qualitative characters*

3.1 Essential oil (%)	3.1
3.2 Oleoresin (%)	8.15
3.3 Piperine (%)	1.6
3.4 Dry recovery (%)	32.5

4. *Reproductive characters*

4.1 Spike orientation	Pendant
4.2 Spike shape	Filiform
4.3 Young spike colour	Greenish yellow
4.4 Spike composition (%)	Bisexual : 99.92 Female : 0.07 Male : 0.01
4.5 Spike length (cm)	17
4.6 Peduncle length (cm)	1.7
4.7 Number of spikes/lateral branch	7.0
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	80.0
4.14 Number of developed fruits per spike	86.0
4.15 Mean number of berries per ten spikes	332
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	155
4.18 1000 fruit volume (cc)	145
4.19 Mean yield per vine (fresh weight)	4.76 Kg green pepper
4.20 Average yield per ha (dry pepper)	2473 Kg

5. *Reaction to major diseases and insect pests*

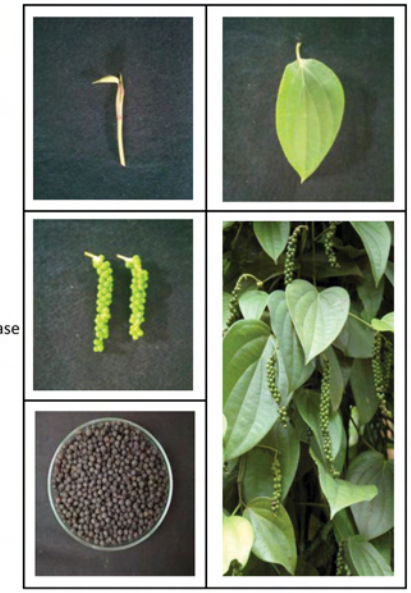
5.1 *Phytophthora* foot rot (*Phytophthora capsici*)	Field tolerant
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Susceptible
5.5 Scale insects (*Lepidosaphes* sp. & *Aspidiotus* sp.)	Susceptible
5.6 Leaf gall thrips	Susceptible

6. *Reaction to aboitic stress*

6.1 Drought	tolerant
6.2 Shade	tolerant

7. *Specific recommendations*

Use only clonal planting material. The package of practices recommended By ICAR- IISR is to be followed.



8. *Diagnostic features*

Stable yielder, suitable for high altitude areas of South India upto 3000ft MSL in coffee and tea estates under rainfed conditions.

1. *Passport details*

1.1 Botanical name and family	*Piper nigrum* L. Piperaceae
1.2 Name of the varitey	IISR Malabar excel
1.3 Year of release	2006
1.4 Institute released the variety	Indian Institute of Spices Research, Marikunnu P.O, Kozhikode, Kerala
1.5 Acc.no.	HP 81
1.6 Pedigree	A hybrid between Cholamundi and Panniyur-1
1.7 Method of breeding adoted	Hybridization
1.8 Areas of adoption	All pepper growing tracts of Kerala
1.9 Maturity group	Medium

2. *Morphological descriptors*

2.1 Vine height (cm)	400
2.2 Branching habit	Polymorphic
2.3 Shoot tip colour	Light purple
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Many
2.7 Lateral branch habit	Erect
2.8 Lateral branch length (cm)	60.4
2.9 Number of nodes per lateral branch	29
2.10 Leaf petiole length (cm)	1.2
2.11 Leaf length (cm)	14.9
2.12 Leaf breadth (cm)	10.8
2.13 Leaf lamina shape	Cordate
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture	Glabrous coriaceous

3. *Qualitative characters*

3.1 Essential oil (%	3.2
3.2 Oleoresin (%)	13.5
3.3 Piperine (%)	2.95
3.4 Dry recovery (%)	32.3

4. *Reproductive characters*

4.1 Spike orientation	Pendant
4.2 Spike shape	Filiform
4.3 Young spike colour	Greenish yellow
4.4 Spike composition (%)	Bisexual : 99.92 Female : 0.07 Male : 0.01
4.5 Spike length (cm)	8.8
4.6 Peduncle length (cm)	1.13
4.7 Number of spikes/lateral branch	13.4
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	70
4.14 Number of developed fruits per spike	46.5
4.15 Mean number of berries per ten spikes	54.5
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	100
4.18 1000 fruit volume (cc)	103
4.19 Mean yield per vine (fresh weight)	3.52 Kg green pepper
4.20 Average yield per ha (dry pepper)	1453 Kg

5. *Reaction to major diseases and insect pests*

5.1 *Phytophthora* foot rot (*Phytophthora capsici*)	Susceptible
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Susceptible
5.5 Scale insects (*Lepidosaphes* sp. & *Aspidiotus* sp.)	Susceptible
5.6 Leaf gall thrips	Susceptible
	Susceptible

6. *Reaction to aboitic stress*

6.1 Drought	Susceptible
6.2 Shade	Tolerant

7. *Specific recommendations*

Use only clonal planting material. The package of practices recommended By ICAR-IISR is to be followed.

8. *Diagnostic features*

A high oleoresin type recommended for rainfed conditions including coffee and tea plantations, high elevations (Upto 3000ft) and plains.

1. *Passport details*

1.1 Botanical name and family	*Piper nigrum* L. Piperaceae
1.2 Name of the varitey	IISR Girimunda
1.3 Year of release	2004
1.4 Institute released the variety	Indian Institute of Spices Research, Marikunnu P.O, Kozhikode, Kerala
1.5 Acc.no.	HP105
1.6 Pedigree	A hybrid between Narayakodi and Neelamundi
1.7 Method of breeding adoted	Hybridization
1.8 Areas of adoption	All pepper growing tracts of Kerala
1.9 Maturity group	Medium

2. *Morphological descriptors*

2.1 Vine height (cm)	500
2.2 Branching habit	Polymorphic
2.3 Shoot tip colour	Greenish yellow
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Many
2.7 Lateral branch habit	Erect
2.8 Lateral branch length (cm)	55.6
2.9 Number of nodes per lateral branch	44
2.10 Leaf petiole length (cm)	1.4
2.11 Leaf length (cm)	14.2
2.12 Leaf breadth (cm)	7
2.13 Leaf lamina shape:	Ovate elliptic
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture:	Glabrous coriaceous

3. *Qualitative characters*

3.1 Essential oil (%)	3.4
3.2 Oleoresin (%)	9.65
3.3 Piperine (%)	2.2
3.4 Dry recovery (%)	32

4. *Reproductive characters*

4.1 Spike orientation	Pendant
4.2 Spike shape	Filiform
4.3 Young spike colour	Greenish yellow
4.4 Spike composition (%)	Bisexual : 99.92 Female : 0.07 Male : 0.01
4.5 Spike length (cm)	17
4.6 Peduncle length (cm)	1.7
4.7 Number of spikes/lateral branch	7.0
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	80
4.14 Number of developed fruits per spike	33.6
4.15 Mean number of berries per ten spikes	30.1
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	155
4.18 1000 fruit volume (cc)	120
4.19 Mean yield per vine (fresh weight)	6.0 Kg green pepper
4.20 Average yield per ha (dry pepper)	2800 Kg

5. *Reaction to major diseases and insect pests*

5.1 *Phytophthora* foot rot (*Phytophthora capsici*)	Susceptible
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Susceptible
5.5 Scale insects (*Lepidosaphes* sp. & *Aspidiotus* sp.)	Susceptible
5.6 Leaf gall thrips	Susceptible

6. *Reaction to aboitic stress*

6.1 Drought	Susceptible
6.2 Shade	Susceptible

7. *Specific recommendations*

Use only clonal planting material. The package of practices recommended by ICAR-IISR is to be followed.

8. *Diagnostic features*

Recommended for rainfed conditions including tea and coffee plantations.Suitable for high altitude. High yielding ability and better stability parameters.

1. *Passport details*

1.1 Botanical name and family	*Piper nigrum* L. Piperaceae
1.2 Name of the varitey	IISR Sakthi
1.3 Year of release	2006
1.4 Institute released the variety	Indian Institute of Spices Research, Marikunnu P.O, Kozhikode, Kerala
1.5 Acc.no.	P24
1.6 Pedigree	Open pollinated seedling progeny of Perambramundi, a local cultivar
1.7 Method of breeding adoted	OP screening and selection
1.8 Areas of adoption	All pepper growing tracts of Kerala
1.9 Maturity group	Medium

2. *Morphological descriptors*

2.1 Vine height (cm)	500
2.2 Branching habit	Polymorphic
2.3 Shoot tip colour	Greenish yellow
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Many
2.7 Lateral branch habit	Erect
2.8 Lateral branch length (cm)	65.6
2.9 Number of nodes per lateral branch	32.6
2.10 Leaf petiole length (cm)	1.69
2.11 Leaf length (cm)	13.37
2.12 Leaf breadth (cm)	7.58
2.13 Leaf lamina shape	Cordate
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture	Glabrous coriaceous

3. *Qualitative characters*

3.1 Essential oil (%)	3.7
3.2 Oleoresin (%)	10.2
3.3 Piperine (%)	3.3
3.4 Dry recovery (%)	43

4. *Reproductive characters*

4.1 Spike orientation	Pendant
4.2 Spike shape	Filiform
4.3 Young spike colour	Greenish yellow
4.4 Spike composition (%)	Bisexual : 99.92 Female : 0.07 Male : 0.01
4.5 Spike length (cm)	8.8
4.6 Peduncle length (cm)	
4.7 Number of spikes/lateral branch	7.0
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	96.0
4.14 Number of developed fruits per spike	86.0
4.15 Mean number of berries per ten spikes	125
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	150
4.18 1000 fruit volume (cc)	114
4.19 Mean yield per vine (fresh weight)	5.2 Kg green pepper
4.20 Average yield per ha (dry pepper)	5755 Kg

5. *Reaction to major diseases and insect pests*

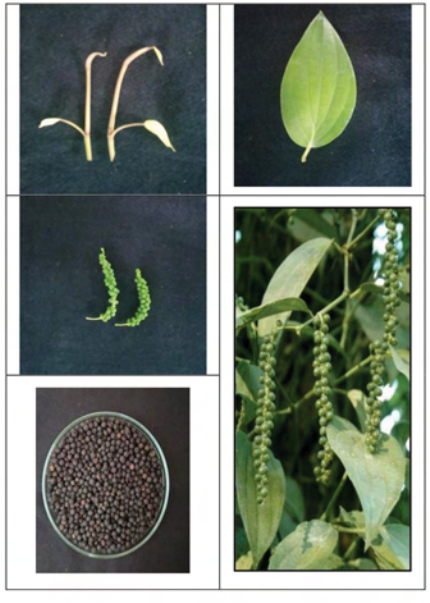
5.1 *Phytophthora* foot rot (*Phytophthora capsici*)	Resistant
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Susceptible
5.5 Scale insects (*Lepidosaphes* sp. & *Aspidiotus* sp.)	Susceptible
5.6 Leaf gall thrips	Susceptible
	Susceptible

6. *Reaction to aboitic stress*

6.1 Drought	Susceptible
6.2 Shade	Tolerant

7. *Specific recommendations*

Use only clonal planting material. The package of practices recommended by ICAR-IISR is to be followed.



8. *Diagnostic features*

A high oleoresin type, inherent nature of resistance to *P.capsici* combined with good quality parameters.

1. *Passport details*

1.1 Botanical name and family	*Piper nigrum* L. Piperaceae
1.2 Name of the varitey	PLD-2
1.3 Year of release	1971
1.4 Institute released the variety	NRC on Oil Palm Regional Station, Palode, Thiruvananthapuram, Kerala
1.5 Acc.no.	Kott.2559
1.6 Pedigree	Clonal selection from cv. Kottanadan (2559)
1.7 Method of breeding adoted	Clonal selection
1.8 Areas of adoption	Kerala
1.9 Maturity group	Late (180-210days)

2. *Morphological descriptors*

2.1 Vine height (cm)	500
2.2 Branching habit	Dimorphic
2.3 Shoot tip colour	Light purple
2.4 Runner shoot production	Many
2.5 Holding capacity	Strong
2.6 Root regeneration capacity	Many
2.7 Lateral branch habit	Erect
2.8 Lateral branch length (cm)	58.2
2.9 Number of nodes per lateral branch	31.4
2.10 Leaf petiole length (cm)	1.4
2.11 Leaf length (cm)	15.48
2.12 Leaf breadth (cm)	8.34
2.13 Leaf lamina shape	Ovate
2.14 Leaf margin	Entire
2.15 Type of veining	Acrodromous
2.16 Leaf texture	Glabrous coriaceous

3. *Qualitative characters*

3.1 Essential oil (%)	4.8
3.2 Oleoresin (%)	15.4
3.3 Piperine (%)	3.0
3.4 Dry recovery (%)	31.13

4. *Reproductive characters*

4.1 Spike orientation	Pendant
4.2 Spike shape	Filiform
4.3 Young spike colour	Greenish yellow
4.4 Spike composition (%)	Bisexual : 95.1 Female : 4.3 Male : 0.6
4.5 Spike length (cm)	8.33
4.6 Peduncle length (cm)	1.37
4.7 Number of spikes/lateral branch	12.4
4.8 Flower arrangement	Free
4.9 Number of stamens	Two
4.10 Spike texture	Glabrous
4.11 Bract type	Cupular with decurrent base
4.12 Flower nature	Sessile
4.13 Fruit setting (%)	87.7
4.14 Number of developed fruits per spike	51
4.15 Mean number of berries per ten spikes	61.1
4.16 Fruit shape	Round
4.17 1000 fruit weight (g)	122.3
4.18 1000 fruit volume (cc)	122.7
4.19 Mean yield per vine (fresh weight)	4.97 Kg green pepper
4.20 Average yield per ha (dry pepper)	2475 Kg
4.21 Potential yield per ha	4731.8 Kg

5. *Reaction to major diseases and insect*

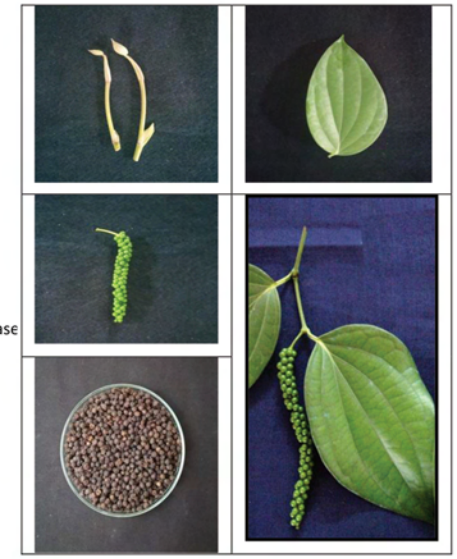
5.1 *Phytophthora* foot rot (*Phytophthora capsici*)	Susceptible
5.2 *Colletotrichum* leaf spot	Susceptible
5.3 Burrowing nematodes (*Radopholus similis*)	Susceptible
5.4 Root knot nematodes (*Meloidogyne incognita*)	Susceptible
5.5 Scale insects (*Lepidosaphes* sp. & *Aspidiotus* sp.)	Susceptible
5.6 Leaf gall thrips	Susceptible
5.7 Pollu beetle	Susceptible

6. *Reaction to aboitic stress*

6.1 Drought	Tolerant
6.2 Shade	Susceptible

7. *Specific recommendations*

Use only clonal planting material. The package of practices recommended by Kerala Agricultural University is to be followed.



8. *Diagnostic features*

Suited to all pepper growing regions-plains and high elevations and in a mixed cropping system. High quality with high oleoresin content.

Black pepper Varieties

high yielding, high quality & disease resistant


Panniyur 1


Panniyur 2

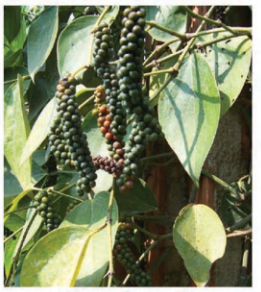

Panniyur 3


Panniyur 4


Panniyur 5


Panniyur 6


Panniyur 7


Panniyur 8


PLD-2


Sreekara


Subhakara


Panchami

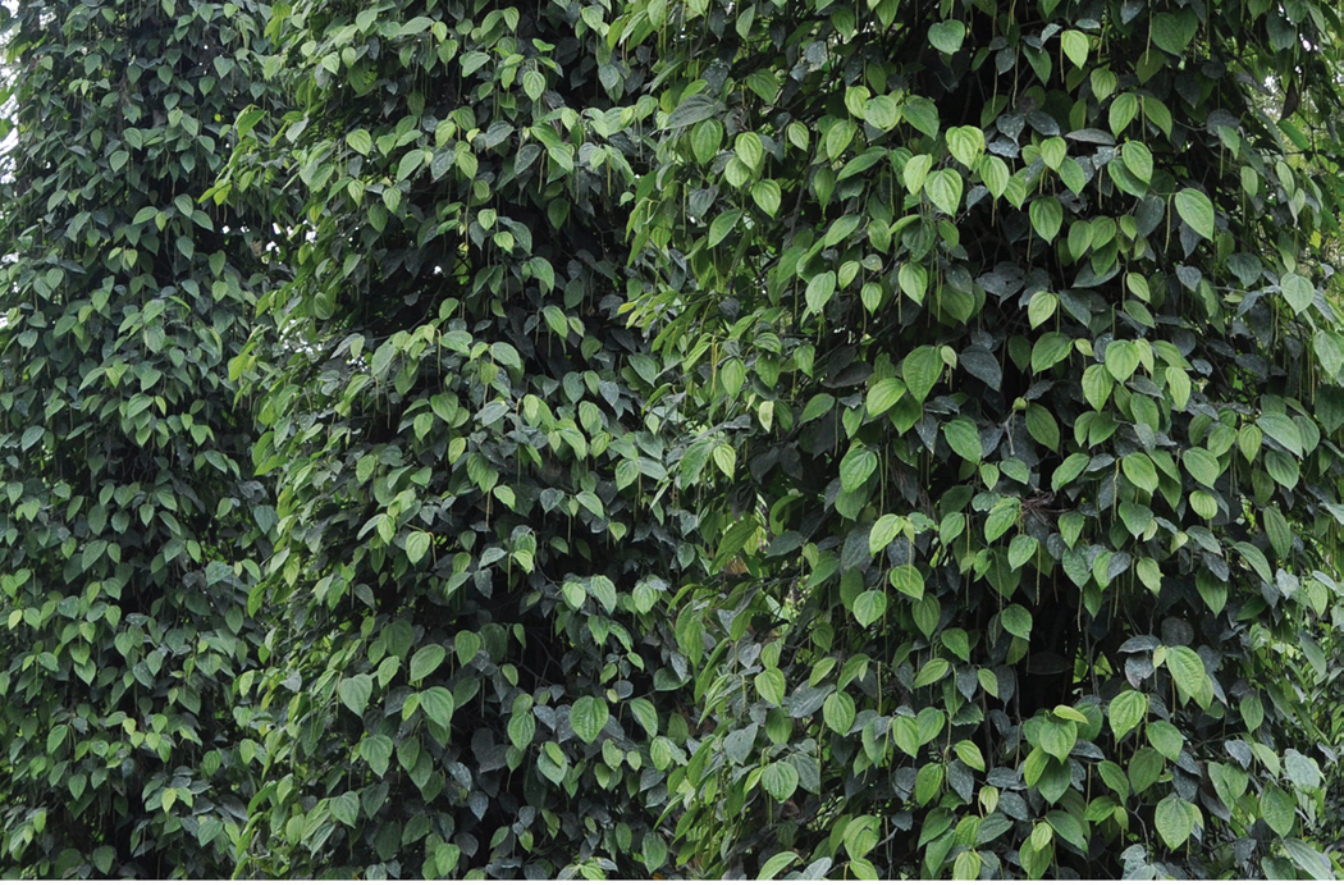

Pournami


IISR Sakthi


IISR Thevam


IISR Girimunda


IISR Malabar Excel



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