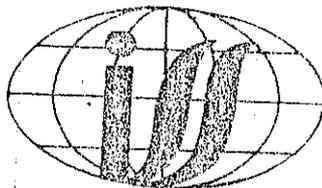


**BLACK PEPPER**  
AND  
**CARDAMOM**  
PROBLEMS AND PROSPECTS



**INDIAN SOCIETY FOR SPICES**  
National Research Centre for Spices  
Calicut, Kerala

## THEME PAPERS

### Improved varieties of black pepper

K NIRMAL BABU AND P N RAVINDRAN

National Research Centre for Spices  
Calicut - 673 012, Kerala

#### Introduction

Black pepper from the perennial climbing vine *Piper nigrum* L., is the world's most important spice. From time immemorial, India is a major producer and exporter of this valuable spice. However, the productivity of black pepper in India is low compared to other major black pepper producing countries. A major bottleneck in increasing production and productivity of black pepper in India has been lack of high yielding varieties and non availability of good quality planting materials.

Black pepper is native to India and the tropical evergreen forests of Malabar region of Southern India is considered to be the centre of origin. In these areas, the black pepper vine still occurs in plenty as a wild plant. In the wild state, black pepper vines are mostly dioecious, but most of the present day cultivars are bisexual. It was presumed that the bisexual nature of present day cultivars might have originated from wild types through continuous selection for high yielding types through ages and their maintenance by vegetative propagation.

#### Cultivars

There are over 100 cultivars of black pepper still cultivated in various parts of Kerala

and Karnataka. Some of the most popular of them are Karimunda, Aimpiriyam, Neelamundi, Narayakodi, Arakulam munda, Kalluvally, etc. in Kerala and Malligesara, Uddakare, etc. in Karnataka (Ravindran & Babu, 1988). These cultivars exhibit great variability with regard to various morphological and agronomic characters as well as yield and yield attributes (Ratnambal *et al.*, 1985). The cultivars Kottanadan, Aimpiriyam, Kumbhakodi, etc. have high oleoresin (> 12%) and hence could be considered high quality types (Raju *et al.*, 1983). Cultivars like Aimpiriyam, Pirimunda, Kurielmundi, etc. have high fruit set. Berries of cultivars Vadaikkan, Karivilanchy, Balankotta, etc. are bold. However, most of the cultivars are preferred only in certain pockets indicating their location specific performances and restricted adaptability. The cultivar Karimunda is the most adaptable among them, showing better performance in most of the areas including under drought and shade conditions.

#### New varieties

Research efforts in the last three decades have resulted in identification and release of eight high yielding varieties of black pepper, which when popularised will contribute substantially to increase the production and productivity of this

spice. Four of these varieties viz., Panniyur-1, Panniyur-2, Panniyur-3 and Panniyur-4 were developed by the Kerala Agricultural University while the rest, Sreekara, Subhakara, Panchami and Pournami were developed by the National Research Centre for Spices.

#### Origin

Panniyur-1 and Panniyur-3 are hybrids involving Cheriakaniakkadan and Uthi-

rankotta as parents. The other varieties are either selections from open pollinated progenies or clonal selections from existing varieties. Panniyur-2 and Panniyur-4 are selections from Balankotta and Kuthiravally (type-2) respectively, while Sreekara and Subhakara are selections from Karimunda (Ratnambal *et al.*, 1990). Panchami is a selection from Aimpiriyan (Ravindran *et al.*, 1992) and Pournami, a selection from the germplasm (Table 1).

**Table 1. Pedigree of black pepper varieties**

Variety	Pedigree
Panniyur-1	Hybrid - Uthirankotta x Cheriakaniakadan
Panniyur-2	Selection from open pollinated progeny of Balankotta
Panniyur-3	Hybrid - Uthirankotta x Cheriakaniakadan
Panniyur-4	Selection from Kuthiravally (type-2)
Subhakara	Selection from Karimunda
Sreekara	Selection from Karimunda
Panchami	Selection from Aimpiriyan
Pournami	Selection from germplasm

#### Yield

All these varieties are high yielding types giving 2.2 to 5.2 kg of green pepper per vine at fifth year of planting in the evaluation trial. They yield an estimated dry pepper of 1242 kg to 2828 kg/ha at fifth year. All of them have

high yield potential which ranges from 2443 kg. to 8800 kg/ha (Table 2). While Panniyur-2, Panniyur-4, Sreekara and Subhakara have wide adaptability, Panniyur-1 and Panniyur-3 prefer open areas with less shade. Panchami performs well both at lower as well as higher elevations.

**Table 2. Yield attributes of black pepper varieties\* (at 5th year after planting)**

Variety	Yield		Yield potential (kg/ha-dry)	Dry recovery (%)
	Green (kg/vine)	Dry (kg/ha)		
Panniyur-1	2.2	1242	8800	35.3
Panniyur-2	4.5	2570	3313	35.7
Panniyur-3	4.4	1953	3269	27.8
Panniyur-4	2.3	1277	2443	34.7
Subhakara	4.2	2352	4487	35.5
Sreekara	4.8	2677	4200	35.0
Panchami	5.2	2828	6528	34.0
Pournami	4.7	2333	5356	31.0

\* Data from Edison *et al.* (1991)

### Morphological characters

These varieties also have good yield attributing characters like high percentage of bisexual flowers (> 84 per cent), high

fruit set (> 68 per cent) and more number of fruits per spike (> 68). Panniyur-1 has the longest spikes (17 cm) and bigger berries (145 cc for 1000) and highest number of berries (125) per spike (Table 3).

Table 3. Important spike characters of black pepper varieties

Variety	Spike length (cm)	Bisexual flowers (%)	Fruit set (%)	No. of fruits on spike	Fruit vol. (per 1000) (cc)	Fruit wt. (per 1000) (g)
Panniyur-1	17.0	99.9	96.0	125	145	155
Panniyur-2	12.3	96.7	74.2	74	120	127
Panniyur-3	14.5	99.9	89.2	89	137	153
Panniyur-4	9.3	96.4	86.7	85	112	116
Subhakara	7.7	99.0	68.0	68	100	103
Sreekara	8.6	98.0	63.4	63	106	108
Panchami	11.2	95.5	82.0	82	108	107
Pournami	12.0	84.0	68.0	68	130	128

### Quality parameters

Piperine, oleoresin and essential oil are important factors contributing to quality of black pepper as a spice. The piperine content in these varieties ranges from 3.4-6.6%, oleoresin from 9.2-13.8% and essential oil from 3.4-7.0%. Panniyur-2 has the highest piperine content (6.6%), Pournami has highest oleoresin (13.8%) while Sreekara has highest oil (7%). Dry recovery ranges from 27.8-35.7% and Panniyur-2 has the highest dry recovery (Table 4).

### Reaction to pests and diseases

All these varieties are susceptible to major diseases and pests like *Phytophthora* foot rot, 'pollu' beetle, top shoot borer and burrowing nematode. Only Pournami is tolerant to root knot nematode while the others are susceptible (Ramana & Mohandas, 1986).

Table 4. Important quality attributes of black pepper varieties

Variety	Piperine (%)	Oleo-resin (%)	Essential oil (%)
Panniyur-1	5.3	11.8	3.5
Panniyur-2	6.6	10.9	NA
Panniyur-3	5.2	12.7	NA
Panniyur-4	NA	9.2	NA
Subhakara	3.4	12.4	6.0
Sreekara	5.1	13.0	7.0
Panchami	4.7	12.5	3.4
Pournami	4.1	13.8	3.4

Since all these varieties are susceptible to major pests and pathogens, adoption of plant protection measures is mandatory while cultivating these varieties. Production and supply of disease free planting materials is another important step in successful cultivation of these new varieties.

## Conclusion

The average productivity of black pepper vines in India is very low compared to other major black pepper producing countries. Prevalence of many low yielding cultivars is one of the factors affecting productivity. To increase productivity, the old low yielding cultivars are to be replaced with new high yielding cultivars with good quality attributes. The release of the eight high yielding varieties becomes more significant to achieve this objective.

## References

- Edison S, Johny A K, Nirmal Babu K and Ramadasan A 1991. *Spices Varieties - A Compendium of Morphological and Agronomic Characters of Improved Varieties of Spices in India*. National Research Centre for Spices, Calicut, 63 pp.
- Raju K, Ravindran P N and Nair M K 1983. Quality evaluation of black pepper. *Indian Spices* 30(1) : 3-5.
- Ramana K V and Mohandas C 1986. Reaction of black pepper germplasm to root knot nematode *Meloidogyne incognita*. *Indian J. Nematol.* 16 : 138-139.
- Ratnambal M J, Ravindran P N and Nair M K 1985. Variability in Kari-munda. *J. Plant. Crops* 13: 154-158.
- Ratnambal M J, Ravindran P N, Nair M K and Nirmal Babu K 1990. Two high yielding selections of Kari-munda. *Spice India* 3(11) : 9-11.
- Ravindran P N and Nirmal Babu K 1988. Black pepper cultivars suitable for various regions. *Indian Cocoa Arecanut & Spices J.* 11(4) : 110-112.
- Ravindran P N, Nair M K and Nirmal Babu K 1992. Panchami - a high yielding selection of black pepper. *Spice India* 5(6) : 11-13.