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## DPLSG-5 (Konkan Ghosali): A promising variety of Sponge gourd at coastal agro-climatic conditions of Maharashtra (India)

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#### Abstract

DPLSG-5 (Konkan Ghosali) a variety of Sponge gourd is characterized by potential yield of 178.99 q/ha in konkan region whereas the yield at Central Experiment Station, Wakavali was about 191.17 q/ha during *kharif* season in the year 2014-15. It possesses better agronomic attributes with medium vine growth and smooth stem pubescence. Konkan Ghosali flowers 50% within 52.69 days after sowing with yellow flowers. The incidence of pest and disease on Konkan Ghosali is low as compared to other check varieties. Also, the variety is characterized by high yield, fruit length and fruit weight in *konkan* region. As the variety has high B: C ratio of 2.17 the farmers in *konkan* region prefers to cultivate the sponge gourd commercially.

**Keywords:** Sponge gourd, Konkan Ghosali, high yield, pest and diseases

#### 1. Introduction

Sponge gourd (*Luffa cylindrica* Roem.) is a tropical and subtropical vegetable crop belonging to cucurbitaceous family and is originated from America (Mazali and Alves, 2005)<sup>[9]</sup>. It is also called as angled gourd or angled loofah which belongs to genus *Luffa* (Zohura *et al.*, 2013)<sup>[18]</sup>. *Luffa* is a cross pollinated crop consisting 26 chromosomes (Bal *et al.*, 2004)<sup>[2]</sup>. Sponge gourd contains fibrous vascular systems composed of lignin, cellulose and hemicelluloses (Rowell *et al.*, 2002)<sup>[14]</sup>. This crop has long history of cultivation in the tropical countries from Middle East and India, China, Japan and Malaysia (Porterfield, 1955)<sup>[11]</sup>. In India, it is cultivated commercially as well as for kitchen gardens during *kharif*, *rabi* and *summer* season (Chakravarty, 1990)<sup>[3]</sup>. It can tolerate a wide range of climate and soil conditions, although excessive rainfall during flowering and fruiting (Bal *et al.*, 2004)<sup>[2]</sup>.

The importance of *luffa* increases in various fields i.e., agriculture, medicines, environmental engineering, biotechnology, also as a vegetable and in industrial purposes throughout the world (Oboh and Aluyor, 2009). Sponge gourd is considered as a nutrition powerhouse, which is considered ideal food for weight loss and also strengthens the immune system. It contains carbohydrates (3%), proteins (0.5%) and vitamin c (18 mg per 100g) (Zohura *et al.*, 2013)<sup>[18]</sup>. Additionally, the leaves, seeds, and fruits of sponge gourd have been used as a vegetable and herb for the treatment of various diseases, including diarrhea and viral infections (Abdel *et al.* 2019)<sup>[1]</sup>.

The use of *Luffa* sponges for personal hygiene and house hold cleaning is common in many countries (Bal *et al.*, 2004)<sup>[2]</sup>. In the developed world, the demand for *Luffa* sponge products for skin care is increasing (Silva *et al.*, 2012). Many environmentally conscious consumers appreciate that *Luffa* sponge products are biodegradable natural and renewable resource (Davis & DeCourley, 1993)<sup>[5]</sup>.

In konkan region of Maharashtra Sponge gourd is traditionally grown in Home-stead gardens and for commercial cultivation in *kharif* and summer season with low yielding local types. The University has recommended the variety 'Pusa Chikni' by considering its good potential for cultivation in the region as the warm and humid tropical climate of konkan is quite suitable. However, there is demand for early, dark green coloured long fruit variety with high yield potential. Thus the efforts were made to find out an early bearing and high yielding sponge gourd variety suitable for konkan region of Maharashtra by making the crosses among different genotypes.

## Breeding Methods

DPLSG-5 (Konkan Ghosali) is a pedigree selection made at Central Experiment Station (CES), Wakavali, Maharashtra (India) by selecting Selection-99 X Pusa Chikni parentage. The parentage selected shown different characteristics such as selection-99 was attractive green colour with early bearing and high yielding, whereas, Pusa chikni is tolerant to downy mildew, light green colour and has good tenderness (Source-IARI). During 2014, the entry of DPLSG-5 was evaluated at the CES, Wakavali from the three genotypes of sponge gourd. Based on its exceptional performance, the entry of DPLSG-5

was also studied on farmer's field at different locations in the *konkan* region for yield and other yield aspects. The genotype DPLSG-5 had a promising yield of 180.95 q ha<sup>-1</sup> for the year 2014, and 177.03 q ha<sup>-1</sup> for the year 2015 (Table 1 & 2). On the other hand, the performance of DPLSG-5 proved promising among different genotypes.

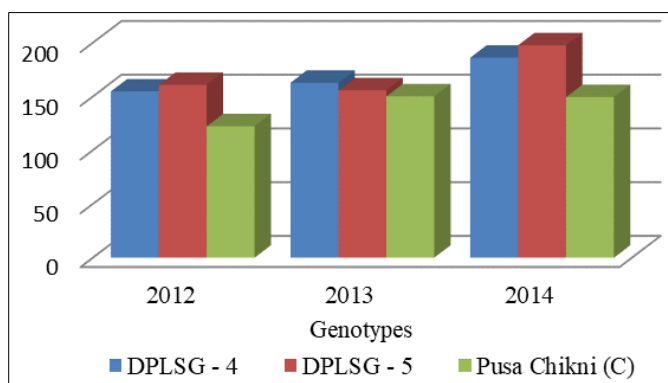
DPLSG-5 and the other two genotypes were evaluated for yield and yield attributing characters. Also, these genotypes were screened artificially for the incidence of diseases and pests in plant growth and harvest.

**Table 1:** Yield (q/ha) of Sponge gourd types at VIS, Wakavali (Station Trial).

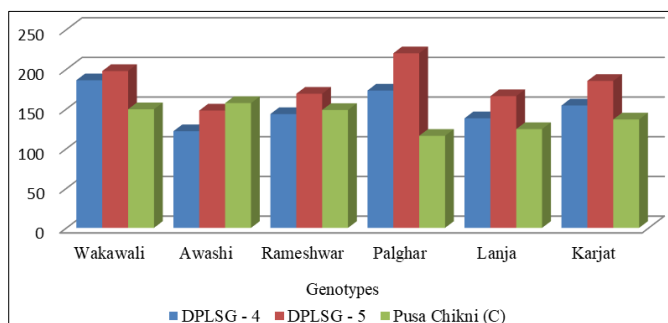
Sr. No.	Genotypes	Average yield (q/ha)			Pooled mean (q/ha)
		2012	2013	2014	
1.	DPLSG - 4	154.68	162.78	186.03	167.83
2.	DPLSG - 5	160.70	155.72	197.64	171.35
3.	Pusa Chikni (C)	122.30	150.11	149.44	140.61
	SE +	5.39	1.89	4.31	6.46
	CD @ 5%	16.19	5.88	13.31	19.41

**Table 2:** Yield (q/ha) of sponge gourd types at different locations (2014).

Sr. No.	Genotypes	Wakawali	Awashi	Rameshwar	Palghar	Lanja	Karjat	Pooled Mean
1.	DPLSG - 4	186.03	121.80	143.42	173.00	138.04	154.22	152.75
2.	DPLSG - 5	197.64	147.90	169.00	220.00	165.99	185.14	180.95
3.	Pusa Chikni (C)	149.44	157.20	148.50	116.00	124.48	136.60	138.70
	SE +	4.31	3.19	4.13	0.16	0.791	4.19	2.80
	CD @ 5%	13.31	9.38	12.67	0.49	2.46	12.81	8.52



**Fig 1:** Yield (q/ha) of Sponge gourd types at VIS, Wakavali



**Fig 2:** Yield (q/ha) of sponge gourd types at different locations (2014)

## Performance characteristics

### Varietal characteristics

DPLSG-5 (Konkan Ghosali) is a monoecious plant with a medium growth habit. It takes 52.69 day for 50% flowering

and the flowers are of yellow colour. The fruits are of cylindrical shape and it takes about 57 days for first harvest and 132 days for last harvest. Moreover, the skin colour of a fruit is dark green with superficial ridge shape and continuous ridges.

### Yield evaluation

Three genotypes were evaluated during the cropping season 2012, 2013, 2014 and 2015 viz, DPLSG-4, DPLSG-5, and Pusa Chikni at VIS, CES, Wakavali. From the mentioned genotypes DPLSG-5 was a prominent high yielding variety with 171.35 q ha<sup>-1</sup> during the year 2012 to 2014 at CES, Wakavali (Table 1). Furthermore, these genotypes were evaluated at different location in *konkan* region (Wakawali, Awashi, Rameshwar, Palghar, Lanja, Karjat, and Mulde) as Multi Location Trials (MLT) for the yield performance. DPLSG-5 was a prominent high yielding genotype with 180.95 q ha<sup>-1</sup> for the year 2014, and 177.03 q ha<sup>-1</sup> for the year 2015 at all the locations of *konkan* region of Maharashtra (India).

### Fruit attributes

The genotypes of sponge gourd were evaluated to record the maximum number of fruits, fruit length, fruit diameter, and fruit weight. Among the fruit attributes studied for three genotypes, the genotype DPLSG-5 was significantly higher in the number of fruits (11.17), fruit length (25.45 cm), fruit diameter (4.63 cm), and fruit weight (124.71 g) than those of other genotypes (Table 4).

### Impact of disease and pest incidence

In cucurbits, powdery mildew is a serious foliar disease at

field and greenhouse conditions (Sharma *et al.*, 2016) <sup>[15, 16]</sup>. This disease is widely destructive in the world which may cause yield loss of about 30%-50% (El-Naggar *et al.* 2012) <sup>[8]</sup>. However, the downy mildew is also a serious airborne and major foliar disease in cucurbits (Sharma *et al.*, 2016) <sup>[15, 16]</sup>. This disease is commonly found in warm weather conditions or tropical environment. The plants affected with downy mildew shows a reduction in photosynthetic activity that shows stunted plant growth and low yield (Colucci and Holmes 2010) <sup>[4]</sup>.

Moreover, the red pumpkin beetle and fruit fly are the major pests of cucurbits. Red pumpkin beetle is polyphagous in nature (Doharey 1983) <sup>[7]</sup>. The crop is severely damaged by both larva and adults at seedling stage and also at young and tender leaves and flowers (Rahaman and Prodhan 2007;

Rahaman *et al.* 2008) <sup>[12, 13]</sup>. Furthermore, Doharey (1983) <sup>[7]</sup> reported that fruit fly infests over 70 host plants of which fruits of *Momordica charantia*, *Cucumis melo*, *Cucumis melo* var. *momordica*, and *Trichosanthes anguina* are the most preferred hosts. The infestation of fruit fly increases when the temperature is below 32 °C and relative humidity ranges between 60%-70% (Dhillon *et al.* 2005) <sup>[6]</sup>. The fruit flies attacks young, green, and soft-skinned fruits. (Sharma *et al.*, 2016) <sup>[15, 16]</sup>.

On this background, the three genotypes of sponge gourd were evaluated to check the incidence of pests and diseases during the cropping season. DPLSG-5 reported a low incidence of pests and diseases as compared to other genotypes (Table 5).

**Table 3:** Yield (q/ha) of sponge gourd types at different locations (2015).

Sr. No.	Genotypes	Wakawali	Awashi	Rameshwar	Palghar	Mulde	Pooled Mean
1.	DPLSG - 4	165.39	167.78	147.63	168.68	167.9	163.47
2.	DPLSG - 5	184.70	181.27	164.28	171.20	183.7	177.03
3.	Pusa Chikni (C)	162.81	161.90	144.3	151.63	164.0	156.92
	SE +	3.39	7.11	3.26	6.12	2.77	1.62
	CD @ 5%	10.44	20.92	10.05	18.85	8.21	5.38

**Table 4:** Growth and yield attributing characters of different types of Sponge gourd.

Sr. no.	Varieties	Vine Length (cm)	No. of branches	50% Flowering (Days)	fruit weight (g)	Fruit Breadth (cm)	Fruit length (cm)	No. of Fruits/vine	Shelf life (Days)
1.	DPLSG - 4	6.57	6.01	52.71	113.66	4.73	19.76	10.98	2-3
2.	DPLSG - 5	6.31	6.22	53.71	124.71	4.63	25.45	11.17	3-4
3.	Pusa Chikni (C)	6.46	5.75	52.57	115.41	5.23	24.77	10.62	3-4
	SE +	0.09	0.14	0.73	1.93	0.09	0.43	0.04	--
	CD @ 5%	0.27	0.43	2.24	5.94	0.27	1.34	0.11	--

**Table 5:** Disease and Pest incidence of different Sponge gourd types.

Sr. No.	Types	Powdery mildew %	Downy mildew %	Fruit fly incidence %	Red pumpkin beetle/vine
1.	DPLSG - 4	6.72	15.73	2.72	2.0
2.	DPLSG - 5	4.18	7.60	2.60	0.7
3.	Pusa Chikni (C)	7.16	12.80	3.40	2.3

#### Disease rating scale

0	:	Immune
0.1 to 10%	:	Resistant
10.1 to 20%	:	Moderately resistant
20.1 to 50%	:	Susceptible
Above 50%	:	Highly susceptible

#### Economic Threshold level

1. Red pumpkin beetle	1 per vine
2. Fruit fly	3% fruit infestation

**Table 6:** Cost of cultivation of different Sponge gourd types.

Sr. No.	Types	Cost of cultivation	Gross returns	Net returns	B: C ratio
1.	DPLSG - 4	1,62,651.00	3,16,220.00	1,53,569.00	1.94
2.	DPLBG - 5	1,65,156.00	3,57,980.00	1,92,824.00	2.17
3.	Pusa Chikni (C)	1,61,415.00	2,95,620.00	1,34,205.00	1.83

\* Selling rate: Rs. 20/kg

#### Shelf life

To estimate the shelf life of sponge gourd, three genotypes were evaluated at CES, Wakavali during the year 2014-15. Among the three genotypes of sponge gourd, DPLSG-5 has a prominent keeping quality (3-4 days) at room temperature whereas, the shelf life of DPLSG-4 is minimum (2-3 days).

**Economics:** The maximum gross returns was observed for DPLSG-5 (Rs. 357980/ ha) whereas the gross returns was

minimum for Pusa chikni (Rs. 295620/ha). Besides, gross returns, the maximum net returns was observed for DPLSG-5 (Rs. 192824/ha) and minimum net returns was observed for Pusa chikni (Rs. 134205/ha). In addition, Benefit cost (B:C) ratio was maximum for DPLSG-5 (2.17) whereas, the B:C ratio was minimum for Pusa Chikni (1.83).

#### Notification and seed production

Cultivar Konkani Ghosali (DPLSG-5) was released and

notified by the central sub-committee on crop standards, notification, and release of varieties vide notification in the official gazette number S.O.4272 (E), dated 26th of November, 2019. The Central Experiment Station, Wakavali,

DBSKKV, Dapoli is the maintainer of this cultivar and the producer of the nucleus and breeder seeds of this sponge gourd.

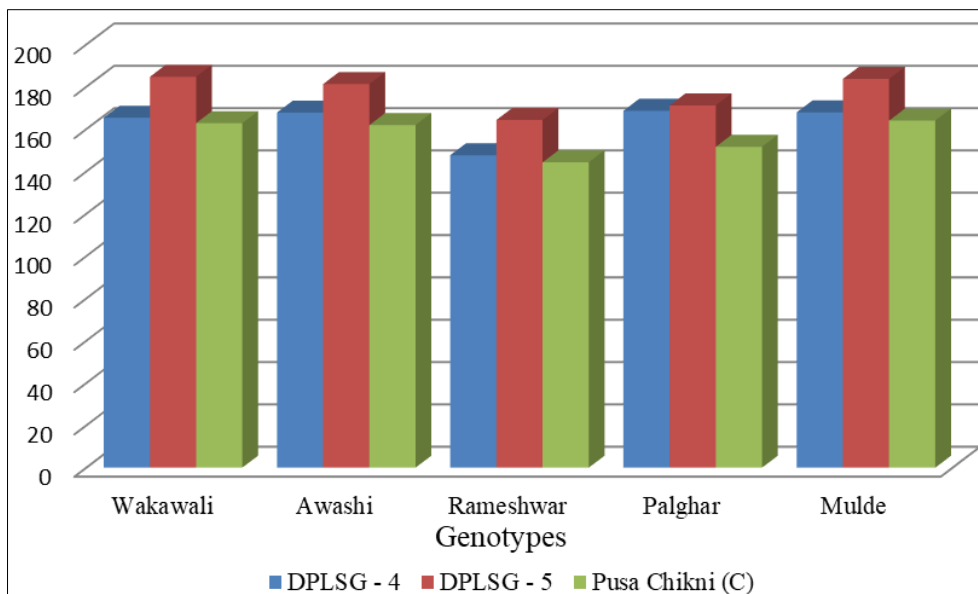


Fig 3: Yield (q/ha) of sponge gourd types at different locations (2015)

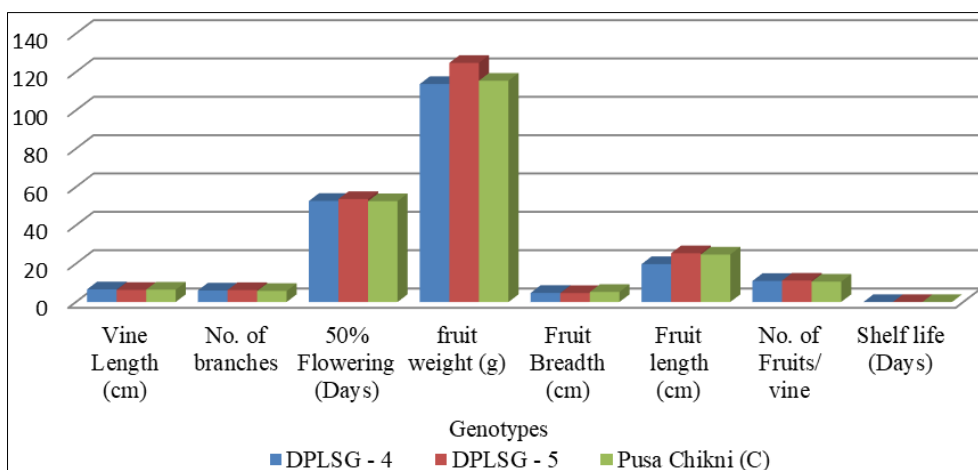


Fig 4: Growth and yield attributing characters of different types of Sponge gourd

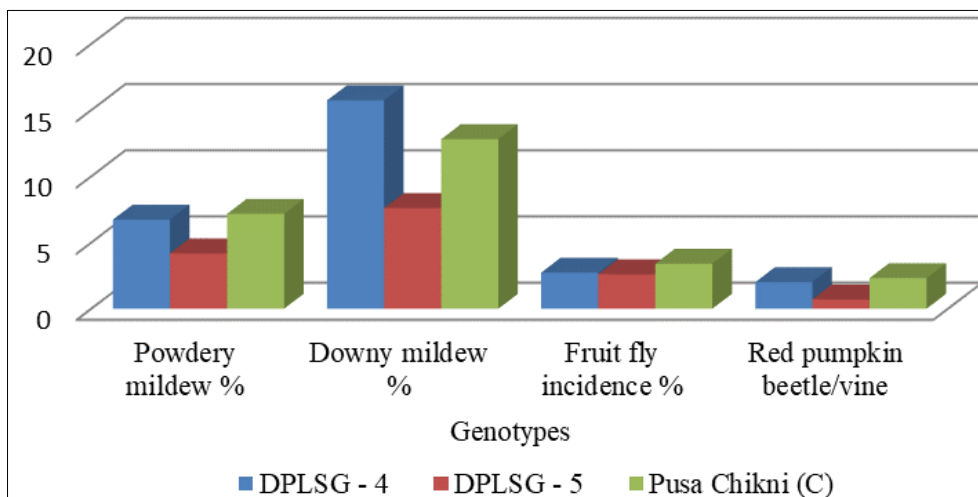


Fig 5: Disease and Pest incidence of different Sponge gourd types

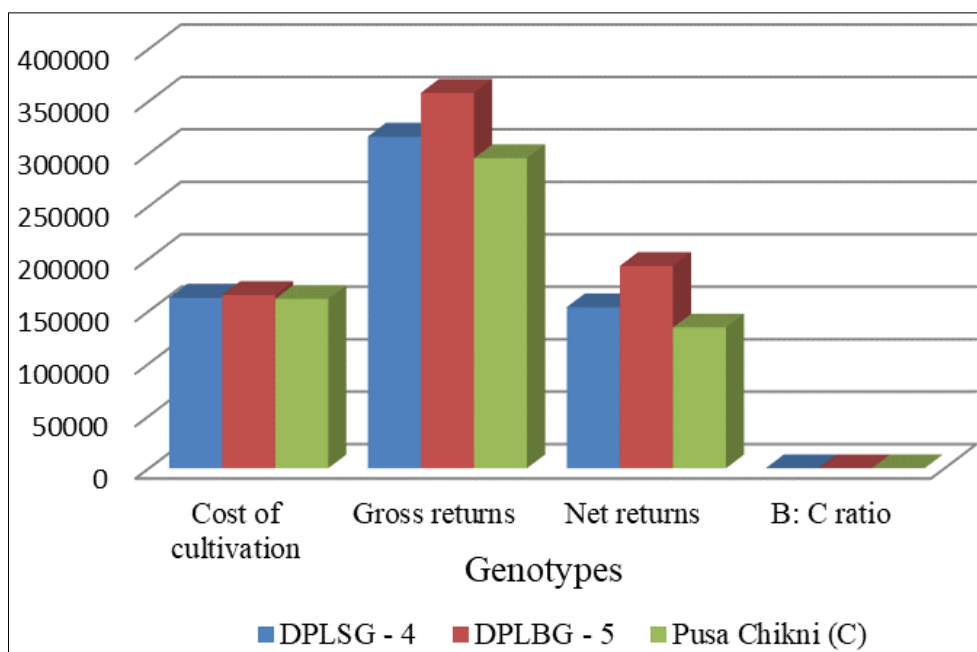


Fig 6: Cost of cultivation of different Sponge gourd types

### Conclusion

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