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Pusa Rasdar: New variety of bitter gourd suitable for protected cultivation

Pusa Rasdar is first open pollinated variety of bitter gourd suitable for growing in insect-proof net house during spring summer (February-June) and *kharif* (July-November) and under polyhouse during winter season (November-March). It is non-parthenocarpic, predominately gynoecious and produces 1-2 lateral branches. It is extra early (43-47 days for first fruit harvest) variety suitable for cultivation under protected condition throughout the year. It requires hand pollination when grown under protected conditions. Fruits are juicy with anti-diabetic properties like saponin (40-45 µg/g) and charantin (35-40 µg/g) and can be used as health drinks. The average fruit weight is 110 g with average yield of 4.7 q/100 sqm insect proof net-house and 4.0 q/100 sqm polyhouse. It has been released and notified by the Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Horticultural Crops for cultivation in National Capital Region of Delhi and its adjoining states.

THE variety Pusa Rasdar can be grown round the year successfully under insect proof net-house and naturally ventilated polyhouse structures for supply of high-quality fruits to urban and peri-urban areas. It is extra early and first fruit harvest is done after 43-47 days of sowing under protected condition. Fruit is juicy and has desirable marketable attributes like attractive dark green colour, unique shape as capsicum, smooth, non-prickled with tender skin and fleshy which is highly acceptable to the growers. The fruits are rich in vitamin C (381.7 µg/g fresh weight) and antioxidant values like CUPRAC (4.21 µmol Trolox/g fresh weight) and FRAP (3.69 µmol Trolox/g fresh weight) at harvest maturity stage (Table 4 and 5).

Nursery raising technique

The bitter gourd seed has hard seed coat and it requires soaking for 24 h before sowing for better germination. The seedlings can also be raised under polyhose or poly-tunnel structure with the help of plastic portrays having cell size of 1.1/2". The soilless media like cocopeat, vermiculite and perlite are used in 3:1:1 ratio for raising seedlings. One seed is sown in each cell. The seedlings are ready for transplanting after 20-25 days in winter season and 18-20 days in summer season. The farmers can grow the crop under net-house through direct seeding during summer season.

Crop grown under protected structure

Transplanting and fertigation

The optimum temperature for better plant growth, flowering and fruiting is 20 to 30^{0}C. It can be grown during winter season under polyhouse conditions by maintaining the required temperature. It can tolerate acidic soils but most suitable *p*H is 5.5 to 6.8. Well drained soil is necessary for its cultivation. It can be planted at a spacing of 20-30 cm between plants and 50 cm between rows on raised beds along with drip irrigation system under protected condition. The transplanting/seeding needs to be carried out towards 2nd to last week of August under net-house and winter crop can be transplanted during November under polyhouse structure. Fertigation with 25:17:26 NPK is the best for better crop growth and yield of quality fruits. The frequency of irrigation is largely dependent on soil type and weather conditions. In addition to NPK, the micronutrients are also required for better fruit quality and higher yields.

Training and pruning

Training and pruning in bitter gourd crops create conditions for maximum production of high-quality fruits by establishing and maintaining plant architecture. The plants are trained upwards so that the main stem is

Table 1. Performance of variety Pusa Rasdar (DBGS – 54) during *kharif* season under insect proof net house (pooled data of 3 years)

Variety	Days to 1st harvesting	Number of fruits/ plant	Individual fruit weight (g)	Yield/ plant (kg)	Yield/ 100 m² (kg)
Pusa Rasdar	44.46	29.40	120.00	3.28	471.12
DBGS – 37	56.88	18.95	90.00	1.77	275.84
DBGS – 32	55.94	21.11	110,50	1.90	275.77
EC – 620354*	44.77	25.72	110.00	2.54	391.57
VNR - 22	60.92	23.81	70.50	1.68	241.70
Bejo sheetal Hybrid	59.72	23.55	80.00	1.92	270.53
CD at 5%	5.73	3.69	10.00	0.26	21.26
CV (%)	6.35	8.39	7.32	6.65	8.64

*Original segregating line

Table 2. Performance of variety Pusa Rasdar (DBGS – 54) during winter season under polyhouse (pooled data of 3 years)

Variety	Days to 1st harvesting	Total Number of fruits/ plant	Individual fruit weight (g)	Yield/ plant (kg)	Yield/ 100 m² (kg)
Pusa Rasdar	47.25	27.69	110.50	2.67	403.28
DBGS – 37	55.99	18.06	91.00	1.48	226.06
DBGS – 32	55.72	20.42	92.50	1.47	200.96
EC – 620354*	47.98	24.01	94.00	2.18	308.81
VNR - 22	58.32	23.20	76.00	1.46	198.32
Bejo sheetal Hybrid	61.59	23.98	68.00	1.72	267.04
CD at 5%	4.40	3.89	4.00	0.21	21.62
CV (%)	4.70	9.27	6.99	6.07	4.45

*Original segregating line

Table 3. Performance of variety Pusa Rasdar (DBGS – 54) during summer season under net house (pooled data of 3 years)

Variety	Days to first harvesting	Total number of fruits per plant	Individual fruit wt (kg)	Yield per plant (kg)	Yield/100 m² (kg)
Pusa Rasdar	43.86	28.19	116.00	3.10	465.00
DBGS – 37	57.79	17.39	96.00	1.82	273.00
DBGS – 32	55.74	20.07	104.00	1.93	289.00
EC 620354*	44.35	24.17	112.00	2.64	395.50
VNR – 22	60.27	22.79	69.50	1.62	243.50
Bejo sheetal Hybrid	59.80	22.93	77.00	1.88	281.50
CD at 5 %	3.94	2.33	10.00	0.16	24.79
CV (%)	4.04	5.67	4.11	4.19	4.21

*Original segregating line

Table 4. Comparative analysis of chlorophyll and carotenoids content of variety Pusa Rasdar (DBGS-54)

Genotype	Total carotenoids (µg/ g fresh weight)	Lycopene (µg/ g fresh weight)	Chlorophyll a (µg/ g fresh weight)	Chlorophyll b (µg/ g fresh weight)	Total chlorophyll (µg/ g fresh weight)
DBGS-37	15.4	3.8	137.2	72.0	212.7
DBGS-32	4.5	0.4	35.1	74.1	111.9

Table 4. (*Concluded*)

Genotype	Total carotenoids (µg/ g fresh weight)	Lycopene (µg/ g fresh weight)	Chlorophyll a (µg/ g fresh weight)	Chlorophyll b (µg/ g fresh weight)	Total chlorophyll (µg/ g fresh weight)
Pusa Rasdar	26.5	17.7	445.0	38.3	488.1
Beejo sheetal hybrid	14.9	1.9	48.2	22.8	71.4
VNR-22	17.4	2.9	25.2	10.8	37.3
CD at 5%	0.3	0.3	13.1	9.4	12.5
SEd	0.2	0.1	6.5	4.7	6.2
CV (%)	4.81	6.70	9.73	8.40	4.99

Table 5. Comparative antioxidant values of variety Pusa Rasdar (DBGS-54) at harvest maturity

Genotype	Vitamin C (µg/ g fresh weight)	CUPRAC (µmol Trolox/ g fresh weight)	FRAP (µmol Trolox/ g fresh weight)
DBGS-37	51.3	3.19	1.31
DBGS-32	34.1	2.84	1.29
Pusa Rasdar	381.7	4.21	3.69
Beejo sheetal hybrid	204.8	4.16	1.54
VNR-22	188.3	5.47	1.16
CD at 5%	19.0	0.27	0.21
SEd	9.4	0.13	0.10
CV (%)	6.34	4.08	5.97

Fruits of Pusa Rasdar

allowed to climb to the overhead wire. Wires are fixed 5-6 feet above the ground. The twine of each plant is alternatively tied to the horizontal overhead wires running along the length of the rows. The base of the twine (string) is anchored loosely to the base of the stem with a non-slip noose. Pruning is required to remove or restrict unwanted growth and to promote flower and fruit production. It also facilitates better light penetration throughout the leaf canopy for more efficient photosynthesis and fruits exposed to light are dark green in colour and attractive.

Flowering and pollination

It starts flowering after 41-45 days of sowing and anthesis occurs during 8-10 AM in the morning. Being a monoecious crop, it requires hand-pollination during the anthesis or bee pollination can be facilitated inside big size protected structure. One person can pollinate approximately 50-60 flowers per hour.

Fruit harvesting and yield

The fruits are ready for harvesting after 8-12 days of pollination. Summer crop under net-house can be harvested after 20 to 25 days of transplanting and after 30-35 days in winter under polyhouse condition. The total crop duration is 4-5 months under protected structure and fruiting period is about 2.5 to 3 months. The fruits are picked up manually and picking is done on alternate day. Harvested fruits must be protected from desiccation and bruising because the skin is very tender. After harvesting fruits are graded according to size, shape and colour of the fruits, and packed and marketed. The average yield is 4.50 q/100 sqm insect proof net-house and 4.00 q/100 sqm poly-house.

Crop protection

Protected structures are designed in such a way to restrict and minimize or eliminate most of the insects by use of the nets of 40 to 50 mesh size and polycarbonate sheets (which is usually U.V. stabilized). Foliar application of Imidacloprid (0.03%) after transplanting is effective to control major insects in bitter gourd. Spraying with Karathane or Bavistin @ 2 g/litre of water is effective to control powdery mildew. Bitter gourd is also sometimes infested with watermelon potyvirus, cucumber green mottle virus (both transmitted by white fly), and bitter gourd mosaic virus (transmitted by aphid). Uprooting and destruction of affected plants and collateral hosts is a common means of control. The whitefly can be controlled by spraining Carbaryl 50WP @2 ml/l of water or Spinosid @1 ml/4 l of water.

For further interaction, please write to:
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