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ASSESSMENT OF SUSCEPTIBILITY OF SELECTED BLACK GRAM VARIETIES TO ROOT-KNOT NEMATODE (*Meloidogyne incognita* Race 2) IN NET HOUSE CONDITIONS

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ABSTRACT

A pot experiment was carried out under net house conditions in the old Directorate of Research building, Bidhan Chandra Krishi Viswavidyalaya, Kalyani, during the years 2024 and 2025 to explore how black gram varieties responded to the root-knot nematode, *Meloidogyne incognita race 2*. Fifteen black gram varieties, viz., Pratap urd-1, Azad urd-1, Kota urd 4, PU 7, PU 8, PU 9, IPU 10-26, PU 31, Uttara, IPU 13-01, Goutam (WBU-105), Sarada (WBU-108), Sulata (WBU-109), Mash 479, and B-77, were obtained from the Department of Agronomy and Genetics and Plant Breeding, BCKV, Kalyani, Nadia, West Bengal. Fifteen days after germination, seedlings were inoculated with 500 cc/pot of second-stage juveniles (J2) of *Meloidogyne incognita race 2*. Each treatment was replicated three times in CRD design. After forty-five days of inoculation, the root-knot index for each variety was determined on the basis of the root-knot index scale (1-5 scale) established by the All India Coordinated Research Project (AICRP) on Nematodes. Observations were recorded on shoot and root growth parameters, root-knot index, number of galls, egg masses, eggs per egg mass, and female population. No variety was identified to be resistant to *Meloidogyne incognita race 2* in both years. In the 1st year, 2024, 9 varieties (Pratap urd-1, Azad urd-1, Kota urd 4, IPU 10-26, PU 31, Uttara, IPU 13-01, Sarada, and Sulata) were classified as susceptible, and 6 varieties (PU 7, PU 8, PU 9, Goutam, Mash 479, and B-77) as highly susceptible, and in the 2nd year, 2025, except for a single variety (PU 31), all became highly susceptible.

Keywords **:** *Meloidogyne incognita*, black gram, susceptible, highly susceptible, root-knot nematode, root-knot index etc.

Introduction

Pulses are an essential component of Indian agriculture and nutrition, especially in a country with a predominantly vegetarian population (Bista *et al.*, 2025). Historically India is the largest producer, consumer and importer of pulses (Reddy, 2012).

Abiotic and biotic stressors have greatly increased the disparity between the potential and actual yield of pulse crop products. In order to bridge this yield gap, it is critical that effective pest and disease control strategies be developed and implemented to provide a stability to pulse crop production in India (Patel & Dash, 2021).

The sedentary endo-parasitic Root-Knot nematode *Meloidogyne incognita* (Kofoid and White) Chitwood is considered one of the most damaging biotic stresses to pulse crops in India. The Root-Knot Nematode cause a lot of root damage, affecting the plant's capacity for absorbing nutrients and resulting in a loss of yield. Yield losses due to infections caused by root-knot nematodes in Chickpeas range from 19 to 22%, Urd-bean yield losses are between 17 and 23%, and

Mung-bean yield losses are between 14 and 29% (Anonymous, 2014; Chakraborty *et al*., 2016).

Understanding pulse accession responses is critical for effective root-knot nematode management in West Bengal. Severe nematode infestations reduce the market quality of agricultural products and cause large yield losses. When compared to chemical nematicides, the use of resistant varieties has been suggested by many researchers as a primary, economically viable, cost-effective, and environmentally friendly method of controlling root-knot nematodes.

Considering the economic importance of black gram and the increasing damage caused by nematode pests, the present investigation was conducted to evaluate the susceptibility of different black gram varieties to the root-knot nematode *Meloidogyne incognita* race 2 under net house conditions.

Materials and Methods

Site and collection of germplasms

In the 1st year, 2024 and 2nd year, 2025, a pot trial was conducted in the old building of the Directorate of Research, Bidhan Chandra Krishi Viswavidyalaya, Kalyani, Nadia, West Bengal, under net house conditions to explore how black gram varieties responded to the root-knot nematode, *Meloidogyne incognita*. Each treatment was replicated 3 times, and the earthen pots were placed in the net house using a completely randomized design (CRD). The seeds of different black gram varieties were obtained from the Department of Agronomy and Genetics and Plant Breeding, BCKV, Kalyani, Nadia, West Bengal.

Collection and preparation of soil media

Soil collected from a nearby field was mixed with well-decomposed FYM in a 3:1 ratio and sterilized using 10% formaldehyde solution to eliminate nematode populations. The treated mixture was covered with black polythene for 7–10 days. Then it was aerated periodically to remove residual fumes. The soil was filled (500 cc per pot) into 6-inch earthen pots after it was confirmed that there were no formaldehyde residues (15 days after cover removal). Three replications of fifteen black gram varieties (mentioned in Table-1) were kept in a total of forty-five pots with appropriate labeling.

Seed sowing and inoculation of juveniles

Five or six Seeds of black gram varieties were sown in each sterile pots with sterilized soil at a depth of (1-1.5) cm, followed by covering with a thin layer of soil. After the operation, pots were sprayed with water. Following 1 week of germination, each pot was thinned leaving with one healthy seedling for inoculation.

In the net house, pure culture of root-knot nematode (*Meloidogyne incognita*) was maintained in brinjal. A population of root-knot nematode (*Meloidogyne incognita*) isolated from brinjal roots, identified on the basis of perineal pattern) was used in the assessment.

Brinjal roots infested with nematodes were carefully uprooted and washed to remove soil. Egg masses were collected using forceps and placed on an aluminum wire gauge lined with tissue paper in a petri-dish containing distilled water, ensuring contact with the water surface. Second-stage juveniles (J2) hatched from the egg masses and were collected after 24 hours.

For counting, 1 ml of J2 suspension was taken and the juveniles were counted under a stereo binocular microscope using a multi-chambered counting dish. This was repeated three times to obtain the average number of juveniles per ml. The total inoculum was calculated by multiplying the average count with the total suspension volume, which was then adjusted for uniformity.

Inoculation was performed 15 days after germination of black gram seedlings. Small holes (3–5 cm deep) were made near the rhizosphere, and 500 cc of J2 suspension was applied using a micropipette. The holes were covered with soil, followed by watering and regular maintenance.

After 45 days of inoculation, black gram plants were uprooted carefully by khurpi without any damage to the plant parts (roots, shoots etc). Then the adhering soil was washed properly under slow running tap water. After that the plant samples were separated at the junction between the shoot and root. In each replication, one root system from each treatment was separated for taking photograph.

Observations

Shoot and root length

The length of the black gram shoot was recorded in centimeters from the level of soil surface to the tip of the longest leaf and the length of the root was recorded in centimeters, measuring from the level of soil surface to the tip of the longest root.

Fresh shoot and root weight

The fresh weight of the shoot and root in each treatment was recorded in grams by a top pan balance.

Dry shoot and root weight

The shoots and roots of different varieties were brought in brown paper packets for drying. First the samples were shed dried and then kept in the oven at 50˚C until the constant weight was gained.

Number of galls, females and egg masses

Number of galls in each root system was measured after 45 days of inoculation by eye inspection. For counting egg masses and female nematodes known quantity of roots (5 gram) were chopped in approximately 1 cm length and stained by acid fuchsin stain by heating for 2 minutes. Following the staining process, roots were washed in water 2-3 times for removing the excess stain and the stained roots were kept in lactophenol in a petri-dish for overnight to destain the roots. The egg masses and nematodes were appeared in red to pink color in transparent root system. After macerating the roots by forceps, the number of egg masses and the sedentary females were counted under stereo zoom microscope.

Number of eggs per egg mass

Egg masses were carefully picked from the infected black gram roots of each variety using a fine forceps. A 1.0% sodium hypochlorite (NaOCl) solution was prepared for the egg extraction process. For each black gram variety, 3 egg masses were selected and placed in separate Petri plates, maintaining 3 replications for each variety. Subsequently, the egg masses along with the solution were transferred to a beaker and gently stirred with a glass rod for about 2-3 minutes to dissolve the gelatinous matrix and release the eggs into the solution. Then the number of eggs per 1 ml solution was counted under a stereo zoom microscope as well as the number of eggs in the entire solution was recorded, representing the combined egg count from the 3 egg masses. Ultimately, the number of eggs per individual egg mass was calculated by dividing the total number of eggs by 3.

Root knot index

The root knot index was measured using the scale (1-5) established by the All India Coordinated Research Project (AICRP) on Nematodes with integrated approach for their management. The scale is provided in the table below.

Observations	Gall Index	Reaction
0 no. of gall	1	Highly resistant (HR)
1-10 no. of galls	2	Resistant (R)
11-30 no. of galls	3	Moderate Resistant (MR)
31-100 no. of galls	4	Susceptible (S)
Above 100 galls	5	Highly Susceptible (SC)

Statistical Analysis

Three replications of each treatment were maintained with a completely randomized design and the data was observed. The observed data was used to calculate the critical difference (CD) at the 5% level of significance which were performed by computer software "OPSTAT1" developed by O. P. Sheoran for ANOVA or analysis of variance.

Results

A study was conducted for screening of fifteen black gram cultivars for resistance to the root-knot nematode, *Meloidogyne incognita* race 2. Plant height, root length, fresh and dry weights of root and shoot, root knot index, number of egg masses per 5 g of root, number of eggs per egg mass, and number of females per 5 g of root were all recorded. The findings from this experiment have been organized and displayed in table 2, table 3, table 4 and table 5.

Above ground parameters

a) Plant height

It was observed that the black gram variety Pratap urd-1 had the highest plant height 32.83 cm, while the variety IPU 10-26 had the lowest height 18.87 cm. It was also found that with reference to plant height there were no significant differences among PU 7, PU 9 and Goutam (WBU-105); PU 8 and Sarada (WBU-108); IPU 13-01, Sulata (WBU-109) and B-77. Comparing the remaining plant heights to the highest and smallest varieties revealed significant difference.

b) Fresh shoot weight

Black gram variety Kota urd 4 was recorded for the greatest fresh shoot weight, 4.63 g and the lowest weight, 2.71 g was obtained in black gram variety B-77. It was also observed that with reference to fresh shoot weight there were no significant differences among Pratap urd-1 and Mash 479; Azad urd-1, PU 9, Uttara and Goutam (WBU-105); PU 8, IPU 10-26, PU 31, IPU 13-01 and Sulata (WBU-109). The fresh shoot weight of the remaining plants differed significantly from that of the heaviest and lightest plants.

c) Dry shoot weight

It was observed that the maximum dry shoot weight of 1.2 g was recorded in the black gram variety Kota urd-4, whereas the minimum dry shoot weight of 0.5 g was noted in the variety PU 31. Additionally, it was discovered that there were no significant differences in dry shoot weight among Azad urd-1, PU 7 and Sarada (WBU-108); PU 8 and Uttara; PU 9, IPU 10-26 and B-77; IPU 13-01 and Sulata (WBU-109). The dry shoot weights of the remaining plants showed significant differences compared to the maximum and minimum recorded dry weights.

Below ground parameters

a) Root length

In terms of root length, the black gram variety IPU 13-01 had the longest root length (10.73 cm), while the smallest root length (6.6 cm) was reported in the variety B-77. Additionally, there were no significant changes in root length between PU 7 and PU 8; Uttara, Goutam (WBU-105) and Mash 479; Sarada (WBU-108) and Sulata (WBU-109). The root lengths of the remaining varieties showed statistically significant differences compared to both the longest and shortest root length.

b) Fresh root weight

In relation to fresh root weight, the variety PU 9 exhibited the highest value, recording 1.62 g, whereas the lowest fresh root weight of 0.33 g was observed in the variety PU 31. Furthermore, the varieties Kota urd 4 and Sulata (WBU-109) were found to be statistically at par with PU 31. It was also noted that no significant differences in fresh root weight existed among Azad urd-1, PU 7, and IPU 13-01; as well as between Uttara and Mash 479. The remaining varieties showed statistically significant differences in fresh root weight when compared to both PU 9 and PU 31.

c) Dry root weight

The highest dry root weight of 0.40 g was recorded in the variety Pratap urd-1, whereas the lowest value of 0.03 g was noted in both Kota urd 4 and PU 31. Moreover, nine varieties including Azad urd-1, PU 7, IPU 10-26, IPU 13-01, Goutam (WBU-105), Sarada (WBU-108), Sulata (WBU-109), Mash 479, and B-77 were statistically similar to Azad urd-1 and PU 31. The remaining varieties exhibited statistically significant differences in dry root weight when compared with both the highest and lowest values.

d) Root-knot index

The investigation was carried out over two years, in the 1st year, 2024 and in the 2nd year, 2025. In the 1st year, 2024, assessment based on the root knot index revealed that nine varieties Pratap urd-1, Azad urd-1, Kota urd 4, IPU 10-26, PU 31, Uttara, IPU 13-01, Sarada (WBU-108), and Sulata (WBU-109) were categorized as susceptible, whereas six varieties PU 7, PU 8, PU 9, Goutam (WBU-105), Mash 479, and B-77 were identified as highly susceptible.

However, during 2025, the evaluation indicated that, based on the root knot index, all varieties were rated as highly susceptible with the exception of a single variety, PU 31, which exhibited as susceptible variety to root-knot nematode.

e) No. of egg masses per 5 g root

Observations on the number of egg masses per 5 g of root system were recorded during 1st year, 2024 and 2nd year, 2025. In 2024, a considerable variation was recorded in the number of egg masses per 5 g of root among different black gram varieties. The variety Mash 479 showed the highest number of egg masses (81.67) per 5 g of root, while the lowest count (33.33) was observed in Pratap urd-1. Statistical analysis indicated no significant differences in the number of egg masses per 5 g of root among IPU 10-26, IPU 13-01, Sarada (WBU-108), and Azad urd-1; as well as among PU 8, Uttara, Sulata (WBU-109), and Kota urd-1; between Goutam (WBU-105) and PU 31; and between B-77 and PU 9. The remaining varieties showed significantly different values in comparison to both the maximum and minimum recorded values.

During 2025, the maximum number of egg masses (100.67) per 5 g of root was recorded in the variety PU 9, while the minimum (65.33) per 5 g root was observed in Kota urd 4. Statistical analysis further indicated that Sarada (WBU-108) did not differ significantly from Kota urd 4. Additionally, no significant differences were found among PU 7, PU 31, and Goutam (WBU-105); between PU 8 and IPU 10-26; and between Uttara and B-77. The number of egg masses per 5 g of root in all other varieties differed significantly from both PU 9 and Kota urd 4.

f) No. of eggs per egg mass

In the 2nd year, 2025, data on the number of eggs per egg mass was recorded. The maximum number of eggs per egg mass (473.33) was observed in the variety IPU 10-26, while the minimum (286.33) was recorded in PU 31. Further analysis revealed that there were no significant differences in the number of eggs per egg mass among Pratap urd-1 and Sarada (WBU-108), as well as among PU 7, IPU 13-01, and Mash 479. The remaining varieties exhibited statistically significant differences when compared to both IPU 10-26 and PU 31.

g) No. of females per 5 g root

In respect to the number of females per 5 g of root system, the maximum number of 144.67 was recorded in Mash 479, while the minimum number of 52.33 was observed in PU 7. It was further observed that Kota urd 4 exhibited no significant difference from PU 7. Additionally, no significant differences were detected between Pratap urd-1 and PU 31. The remaining varieties showed statistically significant differences in the number of females per 5 g of root when compared to both Mash 479 and PU 7.

Discussion

The resistance or susceptibility of plants to plant parasitic nematodes represents the plant's influence on the nematodes' ability to infect, survive, and reproduce (Sharma *et al*., 2006). Use of resistant cultivars is anticipated to become an important strategy for managing nematode populations in the future. Breeding programs should initially choose resistant genotypes based on root knot index during preliminary screenings, and then focus on nematode reproduction levels for selection in advanced stages of evaluation (Hussey and Janssen, 2002).

In the current investigation, plant reaction to *Meloidogyne incognita* was assessed by the extent of galling. In the 1st year, 2024, 9 varieties (Pratap urd-1, Azad urd-1, Kota urd 4, IPU 10-26, PU 31, Uttara, IPU 13-01, Sarada, and Sulata) were classified as susceptible, and 6 varieties(PU 7, PU 8, PU 9, Goutam, Mash 479, and B-77)as highly susceptible and in the 2nd year, 2025, except for a single variety, all became highly susceptible. No variety was identified to be resistant to *Meloidogyne incognita* in both the years. This conclusion is consistent with the findings of Timungpi (2023), who showed that all nine varieties of black gram, namely Beki, SBC-40, SBC-47, SBC-50, SBC-51, Kolong, Manab, Sonkush and IPU-31 were susceptible to *Meloidogyne incognita*. According to Kumar *et al.* (2020[a]), out of 14 mung bean genotypes screened against *Meloidogyne javanica*, none demonstrated resistance, though four genotypes were categorized as moderately resistant. Devi *et al*. (2014) tested 28 mung bean germplasms against *Meloidogyne incognita* and 24 were susceptible, with four being highly susceptible. There were no resistant or moderately resistant genotypes recorded. The results were consistent with those of Bora *et al*. (2004), who screened 282 green gram varieties against *Meloidogyne incognita* and discovered that all of the screened varieties were susceptible or highly susceptible to *Meloidogyne incognita*.

Nematode infection greatly decreases plant growth, as evidenced by decreased shoot length and biomass, although root length frequently increases due to gall formation. The restriction of the upward flow of water and nutrients results in a considerable reduction in important growth parameters such as shoot length and fresh and dry weight across various black gram cultivars. The parasitic interaction of nematodes with plants causes significant morphological and physiological changes, affecting the photosynthetic process. The reduced shoot growth and increased root weight in damaged plants are most likely caused by the formation of giant cells in the root system.

It was observed that in 2025, average plant height ranged from the lowest 18.87 cm in black gram variety IPU 10-26 to 32.83 cm in the black gram variety Pratap urd-1, which were highly susceptible, according to root knot index. The result aligns with Khan (1994) observations, which showed that gall formation on plant roots was significantly higher in susceptible genotypes than resistant ones.

Fresh shoot weight varied from 4.63 g in Kota urd 4 to 2.71 g in variety B-77. In terms of dry shoot weight, the highest value was recorded in Kota urd 4 (1.2 g), while the lowest was noted in PU 31 (0.5 g). Interestingly, according to the root-knot index, Kota urd 4 was classified as a susceptible variety, whereas PU 31 was also recognized as susceptible. According to Khan (2000), there is a constant pattern for shoot characteristics such as plant height, number of leaves, and fresh shoot weight to rise as cultivar resistance increases, whereas root parameters such as fresh and dried root weight decrease. Hussey(1989) also found that nematode infection reduces nitrogen uptake and transport within plants.

According to observations on root length, the black gram variety IPU 13-01 showed the maximum root length of 10.73 cm, while the minimum root length of 6.6 cm was noted in the variety B-77. Based on the root knot index rating, both were identified as highly susceptible.

With respect to fresh root weight, the highest value of 1.69 g was recorded by variety PU 9 (HS), while the lowest fresh root weight of 0.33 g was noted in PU 31 (S). In case of dry root weight, Pratap urd-1 exhibited the highest weight of 0.40 g, whereas the lowest dry root weight of 0.03 g was observed in both Kota urd 4 and PU 31. Among these, Pratap urd-1 and Kota urd 4 were classified as highly susceptible, while PU 31 was identified as susceptible to root galling caused by root-knot nematodes.

Root weight is the better indicator for nematode reproduction due to presence of galls on roots. Due to the development of root galls, root-knot nematode infection significantly increased root weight (Olaniyi *et al*., 2005). According to El-Sherif *et al*. (2007), root-knot nematode infestation boosts root weight in highly susceptible varieties relative to resistant varieties. This happens because the galls operate as metabolic sinks, similar to maturing fruits, quickly diverting nutrients produced in the leaves to the roots and, eventually, to the feeding nematodes. Similarly, Hunt *et al*. (2005) discovered that root-knot nematodes develop specialized feeding cells within plant roots, channelling photosynthates from the leaves to support their growth and activity. As a result, nematode parasitism causes root weight to elevate in susceptible cultivars while shoot weight decreases, affecting the root-to-shoot ratio (Roberts, 1995). Additionally, Fassuliotis (1979) noted that gall formation is frequently used as a primary indication of resistance during screening trials since it is common in highly susceptible plants infected by root-knot nematodes.

All black gram varieties produced different amounts of egg masses of *Meloidogyne incognita*. The nematode species and genus, population density, host plant susceptibility, and prevailing environmental circumstances all had an impact on the number of eggs laid by each female (Anwar *et al*., 2010). According to Niyaz *et al*. (2011), the egg mass index also plays a vital role in identifying the susceptibility of a particular cultivar. The variance in galling and egg mass indices among black gram varieties, together with the unaltered pattern of egg production, suggested that the number of eggs produced serves as a better and more precise measure to evaluate resistance to root-knot nematodes (Shazad *et al*., 2011).

Table 1: List of black gram varieties

Sl. No.	Varieties
1	Pratap urd-1
2	Azad urd-1
3	Kota urd 4
4	PU 7
5	PU 8
6	PU 9
7	IPU 10-26
8	PU 31
9	Uttara
10	IPU 13-01
11	Goutam (WBU-105)
12	Sarada (WBU-108)
13	Sulata (WBU-109)
14	Mash 479
15	B-77

Table 2: Effect on shoot parameters of black gram varieties inoculated with *Meloidogyne incognita* in 2025

Sl. No.	Varieties	Shoot length (cm)	Fresh shoot weight (g)	Dry shoot weight (g)
1	Pratap urd-1	32.83	3.80	1.00
2	Azad urd-1	31.27	3.49	0.70
3	Kota urd 4	28.37	4.63	1.20
4	PU 7	25.00	2.87	0.71
5	PU 8	26.27	3.24	0.80
6	PU 9	25.00	3.53	0.61
7	IPU 10-26	18.87	3.33	0.60
8	PU 31	22.60	3.27	0.50
9	Uttara	27.53	3.62	0.80
10	IPU 13-01	24.23	3.17	0.90
11	Goutam (WBU-105)	24.97	3.71	1.00
12	Sarada (WBU-108)	25.97	2.33	0.72
13	Sulata (WBU-109)	24.73	3.12	0.90
14	Mash 479	23.00	3.83	1.10
15	B-77	24.40	2.71	0.60
	C.D.	**0.536**	**0.24**	**0.075**
	SEm(±)	**0.185**	**0.083**	**0.026**

Table 3: Effect on root parameters of black gram varieties inoculated with *Meloidogyne incognita* in 2025

Sl. No.	Varieties	Root length (cm)	Fresh root weight (g)	Dry root weight (g)
1	Pratap urd-1	9.16	1.49	0.40
2	Azad urd-1	9.7	0.81	0.10
3	Kota urd 4	7.76	0.40	0.03
4	PU 7	8.36	0.80	0.10
5	PU 8	8.3	1.01	0.21
6	PU 9	10.33	1.62	0.39
7	IPU 10-26	10.63	1.51	0.30

8	PU 31	7.3	0.33	0.03
9	Uttara	8.1	0.92	0.11
10	IPU 13-01	10.73	0.80	0.09
11	Goutam (WBU-105)	8.1	1.40	0.30
12	Sarada (WBU-108)	7.1	0.70	0.08
13	Sulata (WBU-109)	6.83	0.40	0.04
14	Mash 479	7.93	0.90	0.10
15	B-77	6.6	0.71	0.05
	C.D.	**0.147**	**0.092**	**0.074**
	SEm(±)	**0.096**	**0.032**	**0.026**

Table 4: Reaction and effect on no. of egg masses/ 5g root of different black gram varieties inoculated with *Meloidogyne incognita* in 2024 and 2025

Sl. No.	Varieties	2024			2025		
		Gall index (In 1-5 scale)	Reaction	No. of egg masses/ 5g of root	Gall index (In 1-5 scale)	Reaction	No. of egg masses/ 5g of root
1	Pratap urd-1	3.4	S	33.33	4.4	HS	88.33
2	Azad urd-1	3.8	S	37.67	4.6	HS	97.00
3	Kota urd 4	3.8	S	41.00	4.2	HS	65.33
4	PU 7	4.6	HS	54.33	4.2	HS	77.00
5	PU 8	4.2	HS	39.00	4.4	HS	90.33
6	PU 9	4.6	HS	75.67	4.4	HS	100.67
7	IPU 10-26	3.8	S	35.00	4.6	HS	92.00
8	PU 31	3.2	S	45.00	3.4	S	78.00
9	Uttara	3.4	S	39.33	4.2	HS	86.33
10	IPU 13-01	3.8	S	37.00	4.4	HS	82.67
11	Goutam (WBU-105)	4.2	HS	44.33	4.2	HS	75.67
12	Sarada (WBU-108)	4	S	37.00	4.4	HS	68.00
13	Sulata (WBU-109)	3.4	S	40.00	4.6	HS	98.67
14	Mash 479	4.8	HS	81.67	4.2	HS	81.00
15	B-77	4.6	HS	73.00	4.6	HS	86.33
	C.D.	**NS**		**2.713**	**NS**		**3.645**
	SEm (±)	**0.415**		**0.935**	**0.365**		**1.256**

S= Susceptible, HS=Highly susceptible; NS= Non-significant

Table 5: Effect on no. of eggs/ egg mass and no. of females/ 5 g root of different black gram varieties inoculated with *Meloidogyne incognita* in 2025

Sl. No.	Varieties	No. of eggs/ egg mass	No. of females/ 5g of root
1	Pratap urd-1	360.00	77.67
2	Azad urd-1	383.33	101.67
3	Kota urd 4	440.00	53.33
4	PU 7	426.67	52.33
5	PU 8	393.33	87.00
6	PU 9	453.33	138.33
7	IPU 10-26	473.33	82.00
8	PU 31	286.33	76.33
9	Uttara	446.33	60.33
10	IPU 13-01	426.67	72.33
11	Goutam (WBU-105)	386.67	106.00
12	Sarada (WBU-108)	306.67	96.00
13	Sulata (WBU-109)	313.33	132.83
14	Mash 479	423.33	144.67
15	B-77	433.33	65.00
	C.D.	**3.73**	**3.57**
	SEm(±)	**1.285**	**1.23**

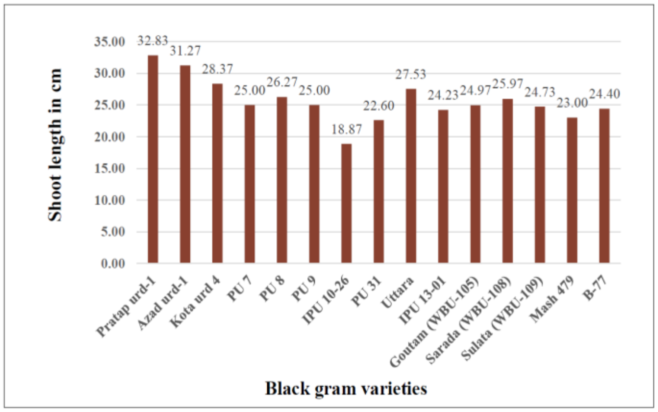

Fig. 1: Shoot length of different black gram varieties

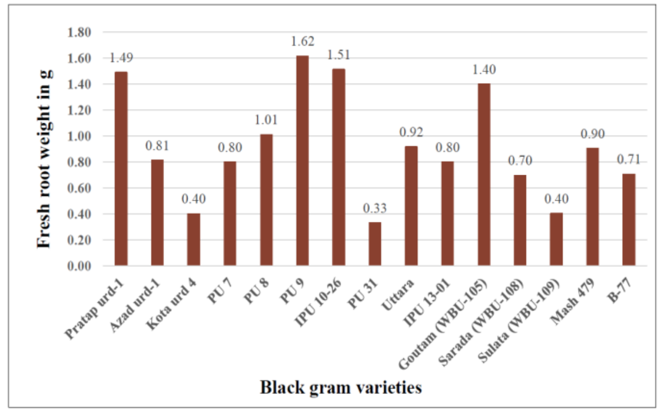

Fig. 5: Fresh root weight of different black gram varieties

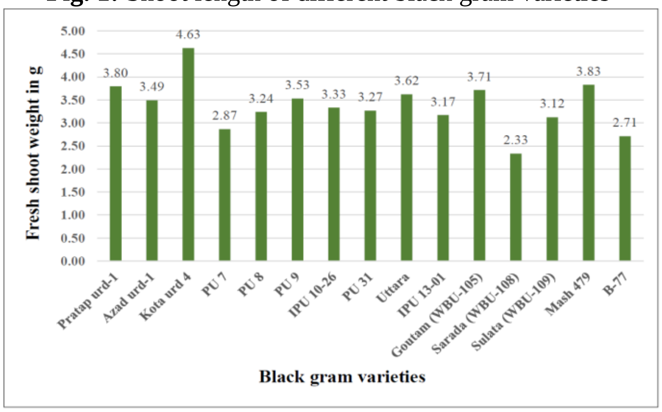

Fig. 2: Fresh shoot weight of different black gram varieties

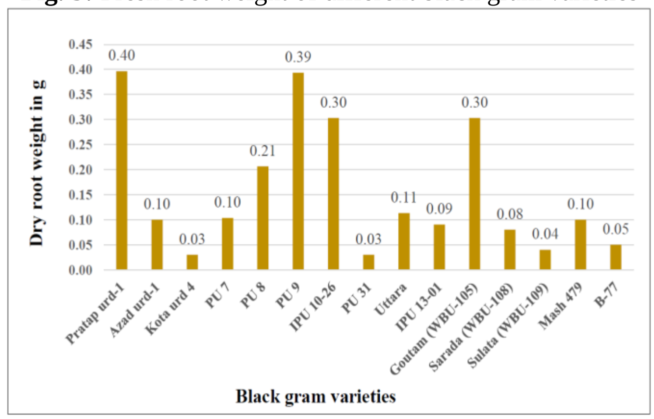

Fig. 6: Dry root weight of different black gram varieties

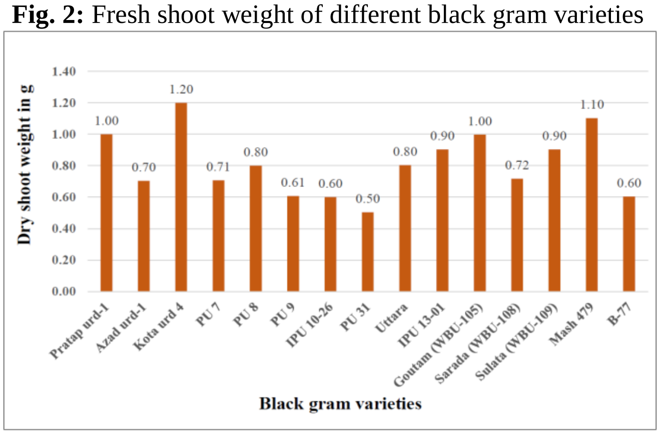

Fig. 3: Dry shoot weight of different black gram varieties

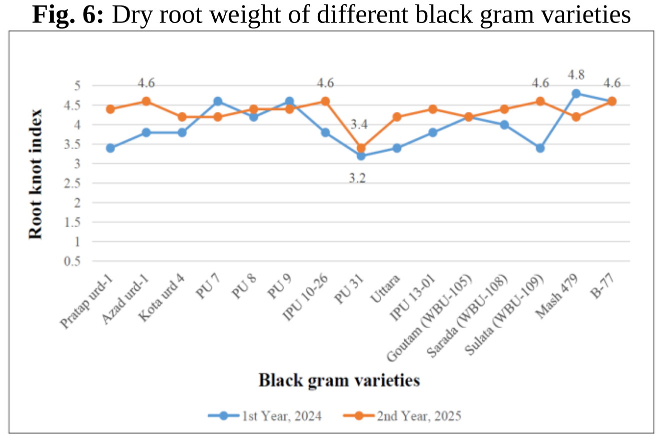

Fig. 7: Root-knot index of different black gram varieties

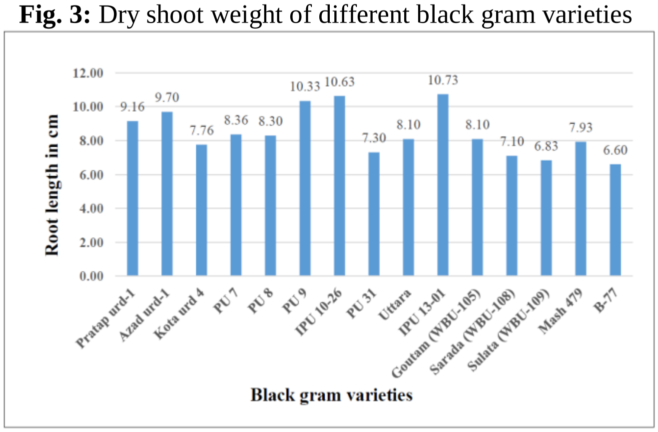

Fig. 4: Root length of different black gram varieties

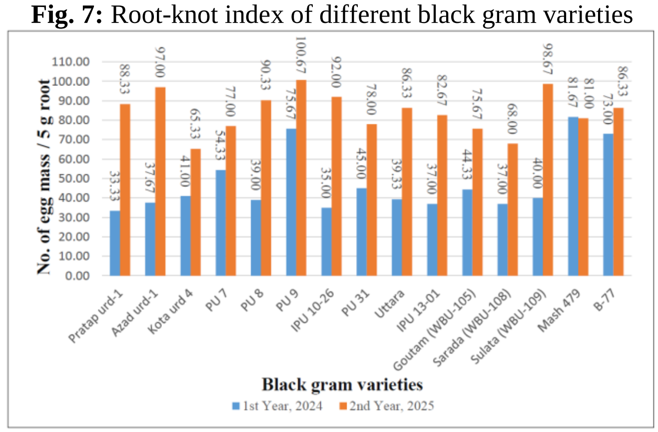

Fig. 8: No. of egg masses/ 5g root of different black gram varieties

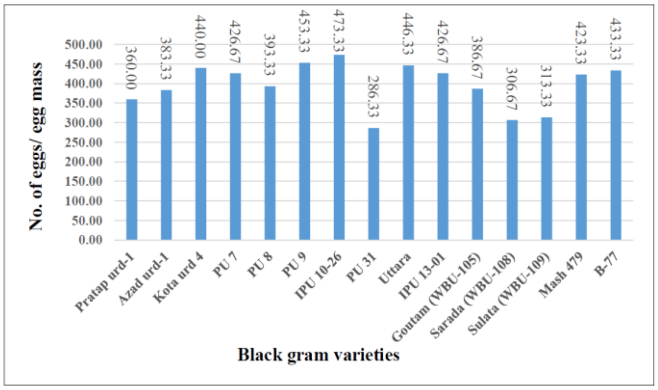

Fig. 9: No. of eggs/ egg mass of different black gram varieties

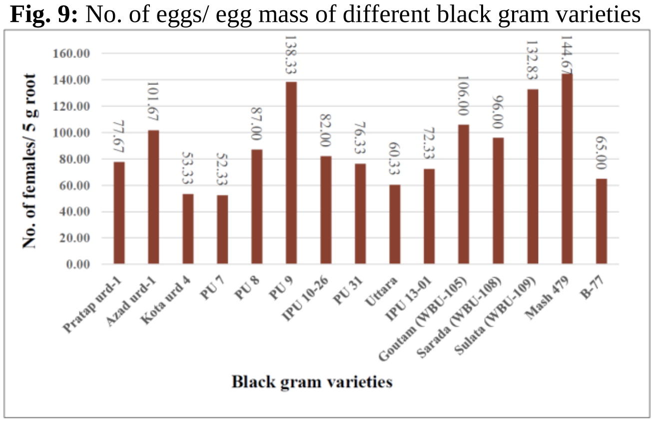

Fig. 10: No. of females/ 5 g root of different black gram varieties

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