Original Research Article

Effect of nitrogen and weed management practices of growth and yield of Blackgram (*Vigna mungo* L.)

- **Abstract:** A research trail was conducted in *Kharif* 2022, at Crop research form, SHUATS, Prayagraj.To study the **"**Effect of nitrogen and weed management practices of growth and yield of Blackgram" (*Vigna mungo* L.). The treatments consist of three levels of nitrogen (15, 30 and 45 kg/ha) and weed management practices (Hand weeding twice (20 & 40 DAS), Pendimethalin (0.75ml/ha) Pre-emergence (5 DAS), Imazethapyr (75g/ha) Post-emergence (25 DAS) are included. Experiment were laid out in randomized block design with 10 treatments each replicated thrice. The result showed that *viz*: significantly higher plant height, number of nodules per plant, number of branches per plant, pods per plant, seeds per pod, grain yield, Stover yield, weed population/m^2, net returns and B:C ratio recorded in (T_9) Nitrogen (45 kg/ha) + Imazethapyr (75 g/ha) Post-emergence.

- **Key words:** Blackgram, Nitrogen, Weed Management Practices, Pendimethalin, Imazethapyr, growth parameters, yield attributes, net return, B:C ratio.

1. Introduction:

Black gram (*Vigna mungo* L.) comes in fourth place among the pulses in terms of both production (12.55% of all pulse production) and cultivated area coverage (approximately 70,000 ha) (BBS, 2012). One of Bangladesh's most treasured pulses is black gram. In addition to being an essential part of our nutrition, pulses have made a significant contribution to Indian agriculture and daily life. Black gramme is the third most significant pulse crop in India. spanning a region of 2,56 million hectares. Despite making up only 8% of the nation's overall production of pulses, it accounts for 12% of the total acreage. This is as a result of Black gram's low average production in India, which is only 467 kg/ha, compared to other legumes' average output of 778 kg/ha. In addition to the crop's genetic makeup, several physiological, biochemical, and intrinsic characteristics also contribute to the low yield. The physiological factors such as inefficient partitioning of assimilates, poor pod setting, excessive flower abscission and lack of nutrients during the critical stages of crop growth were found to be some of the yield barriers of Black gram. Alberta and Bower, 1983 [1].

Nitrogen fertilization plays an important role in improving soil fertility and increasing crop productivity. Nitrogen fertilization increases grain yield and biomass in crop. It contributes 18- 34% increase in soil residual N. Sole residue incorporation or in combination with N fertilizer have positive effects on plant growth and production as well as on soil physico-chemical properties. The use of organic materials in combination

with inorganic fertilizers to optimize nutrient availability to plants is a difficult task as organic materials have variable and complex chemical nature.

Pendimethalin 1000 g/ha is typically advised to manage weeds, but it is ineffective against some perennial sedges and broad-leaved weeds. Pendimethalin usage on a regular basis caused weeds to switch over to having broad leaves. Imazethapyr 75 g/ha is applied post-emergence to control the late-blooming weeds, but because of its longer half-life duration, it also affects subsequent grain harvests. Herbicides must be specific to the crop plants, efficient against a wide range of weeds, safe for the environment, and they shouldn't leave any poisonous residue on future crops. As a result, many herbicides are already available on the market, and new ones are constantly being developed for the effective weed control of soybean and groundnut crops, such as imazethapyr and quizalofop-ethyl.

2. MATERIALS & METHODS:

During the kharif season of 2022, a field experiment was conducted out at the CRF of the wing of Agronomy in SHUATS, Prayagraj, which is located at 25^{o} 24' 42" N latitude, 81^{o} 50' 56" E longitude, and 98 m altitude over the mean sea degree (MSL). to see how nitrogen and weed management practices effect the growth and yield of blackgram (*vigna mungo* L.). The trial was set up in a Randomized Block design with 10 treatments that were reproduced three times. The length of each online plot for each therapy is 3m×3m. When given in combination, the treatment is classified as having a recommended dose of Potash via Muriate of Potash. as well as Nitrogen via Urea and Phosphorus via DAP. T1 Nitrogen (15 kg/ha) + Hand weeding twice (20 & 40 DAS), T2 Nitrogen (15 kg/ha) + Pendimethalin (0.75 ml/ha) Pre-emergence, T3 Nitrogen (15 kg/ha) + Imazethapyr (75 g/ha) Post-emergence, T4 Nitrogen (30 kg/ha) + Hand weeding twice (20 & 40 DAS), T5 Nitrogen (30 kg/ha) + Pendimethalin (0.75 ml/ha) Pre-emergence, T6 Nitrogen (30 kg/ha) + Imazethapyr (75 g/ha) Post-emergence, T7 Nitrogen (45 kg/ha) + Hand weeding twice (20 & 40 DAS), T8 Nitrogen (45 kg/ha) + Pendimethalin (0.75 ml/ha) Pre-emergence, T9 Nitrogen (45 kg/ha) + Imazethapyr (75 g/ha) Post-emergence, T10 Control plot (RDF). At harvesting maturity, the blackgram crop was harvested smartly. Plant height (cm) and dry weight accumulation g/plant were manually recorded on five randomly selected consultant plants from each plot of each replication one at a time, and seeds were isolated from each internet plot and dried under sun for three days after harvesting. Later, the seeds were winnowed, washed, and the seed yield/hectare was calculated and expressed in kg/hectare. After 10 days of thorough drying in the sun, the Stover production from each online plot was measured and expressed in kg/hectare. The statistics were calculated and analysed using. The benefit: cost ratio was reworked after the fee value of seed was replaced with stover and the general value of crop cultivation was protected.

2.1 Details of treatment combinations:

Sr.No	Treatment Combination

1.	Nitrogen (15 kg/ha) + Hand weeding twice (20 & 40 DAS)
2.	Nitrogen (15 kg/ha) + Pendimethalin (0.75 ml/ha) Pre-emergence
3.	Nitrogen (15 kg/ha) + Imazethapyr (75 g/ha) Post-emergence
4.	Nitrogen (30 kg/ha) + Hand weeding twice (20 & 40 DAS)
5.	Nitrogen (30 kg/ha) + Pendimethalin (0.75 ml/ha) Pre-emergence
6.	Nitrogen (30 kg/ha) + Imazethapyr (75 g/ha) Post-emergence
7.	Nitrogen (45 kg/ha) + Hand weeding twice (20 & 40 DAS)
8.	Nitrogen (45 kg/ha) + Pendimethalin (0.75 ml/ha) Pre-emergence
9.	Nitrogen (45 kg/ha) + Imazethapyr (75 g/ha) Post-emergence
10.	Control plot (RDF)

3. RESULTS & DISSCUSIONS:

3.1 Effect on Growth Parameters

3.1.1 Plant height

Height of the plant rise as crop growth progressed, as shown in Table 1. The maximum height measured at harvest for treatment (Nitrogen (45 kg/ha) + Imazethapyr (75 g/ha) (Post-emergence). While T8 (Nitrogen (45 kg/ha) + Pendimethalin (0.75 ml/ha) (Pre-emergence) (62.96 cm) and T7 (Nitrogen (45 kg/ha) + Hand weeding twice (20 & 40 DAS) (86.447 cm) was found to be statistically at par with T9. It might be due to the field experiment to investigate the effect of nitrogen and carbon on the growth and yield performance of mungbean (*Vigna radiata* L. wilczek). He found that the plant height of mungbean was found to be increased with nitrogen at 40 kg/ha Hamid 1988. [2].

3.1.2 Nodule of plant

The plant nodule (34.33) was maximum T9 (Nitrogen (45 kg/ha) + Imazethapyr (75 g/ha) (Post-emergence). While T8 (Nitrogen (45 kg/ha) + Pendimethalin (0.75 ml/ha) (Pre-emergence) (33.27) and was found to be statistically at par with T9. It might be because of nitrogen (0, 20, 40 and 60 kg ha-1) and P (0, 25, 50 and 75 kg ha- 1) on the growth and seed yield of mungbean. They observed that the number of nodules per plant was increased with the increasing rates of N up to 40 kg/ha followed by a decrease with further increase in N.Srinivas *et al*., 2002 [3].

3.1.3 Number of branchs/plant

The number of plant branch (6.40) was maximum T9 (Nitrogen (45 kg/ha) + Imazethapyr (75 g/ha) (Post-emergence). While T8 (Nitrogen (45 kg/ha) + Pendimethalin (0.75 ml/ha) (Pre-emergence) (6.20) and T7 (Nitrogen (45 kg/ha) + Hand weeding twice (20 & 40 DAS) (5.93) was found to be statistically at par with T9. It might be due to the conducted an experiment to determine the effect of varying levels of nitrogen (0, 25 and 50 kg ha-1) on the yield and quality of mungbean *cv*. NM-98. Growth (number of branches per plant) and yield components were significantly affected by varying levels of nitrogen and phosphorus. A fertilizer combination of 25 kg Nitrogen + 75 kg Phosphorus resulted with maximum seed yield (1112.96 kg/ha). Malik *et al*. 2003 [4].

3.1.4 Dry weight of plant

Maximum accumulation of plant dry weight (16.54) was maximum T9 (Nitrogen (45 kg/ha) + Imazethapyr (75 g/ha) (Post-emergence). While T8 (Nitrogen (45 kg/ha) + Pendimethalin

(0.75 ml/ha) (Pre-emergence) (16.12) and T7 (Nitrogen (45 kg/ha) + Hand weeding twice (20 & 40 DAS) (15.79) was found to be statistically at par with T9. The production of more dry matter per plant might be due to nitrogen application and weed control herbicide application which might have helped in utilizing the natural resources viz., light, nutrients and soil moisture more efficiently which may converted into organic constituents and also attributed to enhanced plant height and leaf area led to attain dry mass. These findings were reported by Rathore *et al*. 2015 [5].

3.2 Yield and Yield Attributes:

3.2.1 Pods/Plant

The statistical analysis of Maximum (32.13) number of pods/plant was obtained with application of T9 (Nitrogen (4 5kg/ha) + Imazethapyr (75 g/ha) (Post-emergence). Application of Phosphorus along with Molybdenum increased the number of pods per plant might be due to the enhanced early vegetative growth in terms of higher leaf area, dry matter accumulation and vigorous root system resulted in more branches which consequently increased the number of pod bearing branches significantly. Similar findings were observed by Singh *et al*. 2020 [6] and Chatterjee *et al*. 2017 [7].

3.2.2 Seeds/pod

The statistical analysis of the maximum (8.73) number of seeds/pod was obtained with application of T9 (Nitrogen (45 kg/ha) + Imazethapyr (75 g/ha) (Post-emergence). Nitrogen application may mobilize the photosynthates from growing organs to grains, consequently increasing their number and size Singh *et al*., 2017 [8].

3.2.3 Weed population/m^2

The statistical analysis of the lower weed population/m^2 was (4.06 m^2) in the application T9 (Nitrogen (45 kg/ha) + Imazethapyr (75 g/ha) (Post-emergence). Whereas, T8 (Nitrogen (45 kg/ha) + Pendimethalin (0.75 ml/ha) (Pre-emergence) (8.483) were statistically at par T9. The weed species were effectively controlled by herbicides *i.e*., imazethapyr and pendimethalin. imazethapyr as compared to alone application of pendimethalin as PE and imazethapyr as PoE. Both doses of pre-mix herbicide imazethapyr and pendimethalin were equally effective as two hand weedings at 20 and 40 days after sowing and they were statistically at par with each other whereas all the weed control treatments were significantly superior to weedy check in respect to reduce the weed population. The reduction weed control treatments except imazethapyr. The findings were in close agreement with previously reported by Bhandari *et al*. 2004 [9].

3.2.4 Seed yield

Different combinations of nitrogen & weed management can have a significant effect on seed production. Highest (1223.33 kg/ha) seed yield (kg/ha) was obtained with application of T9 (Nitrogen (45 kg/ha) + Imazethapyr (75 g/ha) (Post-emergence). The increase in seed yield due to phosphorus application is attributed to source and sink relationship. It appears that greater translocation of photosynthates from source to sink might have increased seed

yield Patel *et al*. 1984 [10]. Phosphorus increases yield due to its well-developed root system, increased Nitrogen fixation and its availability to the plants and favourable environments in the rhizosphere. Paes *et al* 2010 [11].

3.2.5 Stover yield

The stover yield output of the blackgram crop had also been greatly altered by the treatment of nitrogen & weed management. Stover yield (kg/ha) was maximum (2472.67 kg/ha) in the application T9 (Nitrogen (45 kg/ha) + Imazethapyr (75 g/ha) (Post-emergence). Whereas, T8 (Nitrogen (45 kg/ha) + Pendimethalin (0.75 ml/ha) (Pre-emergence) (1548.33 kg/ha) and T7 (Nitrogen (45 kg/ha) + Hand weeding twice (20 & 40 DAS)) (2392.67 kg/ha) were statistically at par T9. Stover yield of Black gram was significantly influenced with increasing levels of molybdenum. This is perhaps due to the combined application of P and Mo, which enhanced the survival and multiplication of microorganisms, improved nitrogen fixation, transport of sugars and better up take and assimilation of available nutrients by the plants during the entire growth period. Similar results have been reported by the findings of Sahare *et al*. 2019 [12].

4. CONCLUSION:

It is concluded that the treatment T9 with the combination of Nitrogen (45 kg/ha) + Imazethapyr (75 g/ha) Post-emergence was found significantly more productive. It is also recorded that maximum Benefit cost ratio (2.0) as compared to other treatment combinations.

6. REFERENCES:

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Treatment No	Treatments	Plant height (cm)	Nodule /plant	Branchs /plant	Dry Weight (g)
1.	Nitrogen (15 kg/ha) + Hand weeding twice (20 & 40 DAS)	47.12	11.07	4.00	11.85
2.	Nitrogen (15 kg/ha) + Pendimethalin (0.75 ml/ha) Pre-emergence	49.45	12.33	4.38	13.04
3.	Nitrogen (15 kg/ha) + Imazethapyr (75 g/ha) Post-emergence	52.47	13.60	4.67	13.67
4.	Nitrogen (30 kg/ha) + Hand weeding twice (20 & 40 DAS)	55.17	15.13	5.07	14.27
5.	Nitrogen (30 kg/ha) + Pendimethalin (0.75 ml/ha) Pre-emergence	57.33	16.73	5.27	14.67
6.	Nitrogen (30 kg/ha) + Imazethapyr (75 g/ha) Post-emergence	58.45	18.67	5.53	15.25
7.	Nitrogen (45 kg/ha) + Hand weeding twice (20 & 40 DAS)	61.67	20.73	5.93	15.79
8.	Nitrogen (45 kg/ha) + Pendimethalin (0.75 ml/ha) Pre-emergence	62.96	22.40	6.20	16.12
9.	Nitrogen (45 kg/ha) + Imazethapyr (75 g/ha) Post-emergence	64.49	23.80	6.40	16.54
10.	Control plot (RDF)	45.87	10.40	3.53	10.73
	F-test	S	S	S	S
	SEm (±)	2.91	0.78	0.58	0.91
	CD (p=0.05)	1.69	2.15	1.72	2.76

Table 1. Effect of nitrogen and weed management practices on growth parameters of blackgram at harvest.

Table 2. Nitrogen and weed management practices influence of yield and Characteristics.

Treatment No	Treatments	Pods/plant	Seeds/ pod	Weed population/ m^2	seed yield (kg/ha)	Stover yield (kg/ha)
1.	Nitrogen (15 kg/ha) + Hand weeding twice (20 & 40 DAS)	22.40	5.00	7.65	729.33	1616.67
2.	Nitrogen (15 kg/ha) + Pendimethalin (0.75 ml/ha) Pre-emergence	23.40	5.40	6.36	856.67	1718.67
3.	Nitrogen (15 kg/ha) + Imazethapyr (75 g/ha) Post-emergence	23.87	5.80	7.54	851.67	1846.33
4.	Nitrogen (30 kg/ha) + Hand weeding twice (20 & 40 DAS)	24.67	6.00	8.05	962.67	2003.33
5.	Nitrogen (30 kg/ha) + Pendimethalin (0.75 ml/ha) Pre-emergence	26.60	6.40	5.99	1034.33	2124.33
6.	Nitrogen (30 kg/ha) + Imazethapyr (75 g/ha) Post-emergence	27.60	6.80	5.48	1069.67	2217.00
7.	Nitrogen (45 kg/ha) + Hand weeding twice (20 & 40 DAS)	28.93	7.40	8.48	1113.67	2274.33
8.	Nitrogen (45 kg/ha) + Pendimethalin (0.75 ml/ha) Pre-emergence	30.47	7.60	5.08	1163.00	2392.67
9.	Nitrogen (45 kg/ha) + Imazethapyr (75 g/ha) Post-emergence	32.13	8.20	4.06	1223.33	2472.67
10.	Control plot (RDF)	21.27	4.40	9.44	630.67	1548.33
	F-test	S	S	S	S	S
	SEm (±)	0.96	0.36	0.47	30.54	58.63
	CD (p=0.05)	2.87	1.08	1.40	90.74	174.21