



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(4): 2494-2496
Received: 13-05-2019
Accepted: 15-06-2019

Darade GA

M.Sc. Scholar, Department of
Agronomy, College of
Agriculture, Badnapur,
Vasanttrao Naik Marathwada
Krishi Vidyapeeth, Parbhani,
Maharashtra, India

Gosavi SV

Assistant Professor ARS,
Department of Agronomy,
College of Agriculture,
Badnapur, Vasanttrao Naik
Marathwada Krishi Vidyapeeth,
Parbhani, Maharashtra, India

Elumle Priyanka

M.Sc. Scholar, Department of
Agronomy, College of
Agriculture, Badnapur,
Vasanttrao Naik Marathwada
Krishi Vidyapeeth, Parbhani,
Maharashtra, India

Correspondence**Darade GA**

M.Sc. Scholar, Department of
Agronomy, College of
Agriculture, Badnapur,
Vasanttrao Naik Marathwada
Krishi Vidyapeeth, Parbhani,
Maharashtra, India

Effect of foliar nutrition on growth and yield of blackgram (*Vigna mungo* (L). Hepper)

Darade GA, Gosavi SV and Elumle Priyanka

Abstract

Present investigation entitled Effect of foliar nutrition on growth and yield of blackgram [*Vigna mungo* (L). Hepper], was carried out at Agriculture Research Station, Badnapur, situated at 19° 52' 00" North latitude and 75° 44' 00" East longitudes at 498 m altitude above mean sea level on clayey soil with low in nitrogen and phosphorus and high in potassium.

Experimental result revealed that growth characters viz., plant height, number of branches plant⁻¹, Leaves plant⁻¹, Dry matter plant⁻¹, yield contributing characters viz., no. of pod plant⁻¹, no. of seed pod⁻¹, grain weight plant⁻¹, test weight, seed yield plot⁻¹, Seed yield ha⁻¹, Straw yield ha⁻¹. However, application of RDF+ Neem coated urea 2 percent + Salicylic acid (75 ppm) sprays at flower initiation significantly influenced the growth and yield characters. On the other hand, in all cases the lower response was found from only RDF treatments.

Keywords: Black gram, foliar nutrition, neem coated urea, RDF, salicylic acid, yield

Introduction

Black gram [*Vigna mungo* (L). Hepper] is one of the most important pulse crop grown throughout the India. Black gram is excellent source of protein as well as carbohydrates. Black gram [*Vigna mungo* (L). Hepper] belong to the family "Leguminosae" and sub-family "Papilionaceae" having chromosomes number 2n=24. It also known as "Mash bean and urdbean". Most of the scientist believes that the India is a primary center of origin and Central Asia is considered as a secondary center of origin of black gram. Black gram is probably native of India as is seen from the Vedic literature; there is a mention of Urd bean in Vedic texts such as Kautilya's "Arthasasthra" and "Charaksamhita" (Singh *et al.*, 2010) [8].

Black gram is third important crop of India which is cultivated over a wide range of agro-climatic zones of the country. It is mainly a day neutral warm season crop commonly grown in semi-arid to sub-humid low land tropics and sub-tropics. In India, black gram traditionally grown in *Kharif* season, but in south it also grown as *rabi* crop. It is grown in area at which received annual rainfall is 800 mm. It is a hardy and drought resistant plant.

Black gram producing major states in India are Madhya Pradesh, Rajasthan, Uttar Pradesh, Andhra Pradesh, Tamilnadu and Maharashtra (Anonymous, 2017-18). It occupies about 50.31 Lakh ha area in the country producing 32.84 Lakh tones. The total area under the crop has increased progressively from 1.98 million ha in 1964 - 1965 to 3.10 million ha in 2016- 2017. Similarly, the production has increased from 0.64 million tone to 1.74 million tone (Anonymous, 2017a). The area under Maharashtra state is 4.84 lakh ha with the production of 1.77 lakh tones and productivity is 385 Kg ha⁻¹. (Anonymous, 2017-18).

Throughout the India, black gram is used for different purpose. The major portion is utilized in making dal, soup, curries, sweet, snacks, idli and dosa. The food values of black gram in its high and easily digestible protein. Its seed contain approximately 25-28 percent protein, 1-1.5 percent oil, 3.5-4.5 percent fiber, 4.5-5.5 percent ash and 62-65 percent carbohydrates on dry weight basis (Anonymous, 2017c). Black gram protein content is more than twice that of cereals reported by Thesiya *et al.* 2013.

Material and Methods

The present field experiment was conducted during *kharif* season of 2018-19 at the Experimental Farm of Agronomy at Agriculture Research Station, Badnapur, Jalna (Maharashtra), Vasanttrao Naik Marathawada Krishi Vidyapeeth Parbhani. The initial soil sample analysis the experimental plot was clayey in texture, low in available nitrogen (180.36 kg ha⁻¹), moderate in available phosphorus (14.36 kg ha⁻¹), high in available potassium (460.59 kg ha⁻¹). The soil was slightly alkaline in reaction (7.96 pH). The experiment was laid out in Randomized Block Design with three replications. The treatments were (T₁) RDF (25:50:00

NPK kg/ha), (T₂) RDF+ Neem coated urea 2 percent spray at flower initiation, (T₃) RDF+TNAU Pulse Wonder @ 5 kg/ha spray at flower initiation, (T₄) - RDF+ Salicylic acid (75 ppm) spray at flower initiation and 7 days after 1st spray, (T₅) - RDF+19:19:19 (NPK) 2 percent spray at flower initiation, (T₆) - RDF+ Neem coated urea 2 percent + Salicylic acid (75 ppm) sprays at flower initiation, (T₇) - RDF+ Boron @ 0.25 ppm spray at flower initiation, (T₈) - RDF+ Nitrobenzene @ 500 ppm spray at flower initiation and (T₉) - RDF+NAA (50 ppm) spray at flower initiation. Sowing was done by dibbling by using seed rate 12 kg ha⁻¹. The gross and net plot size was 5.10 x 4.50 m and 4.50 x 4.30 m respectively. The total rainfall received during growth period of Black gram was 381 mm with 17 rainy days. The recommended dose of fertilizer was 25:50:00 kg NPK ha⁻¹ applied as per treatments through DAP. Other cultural practices were done as per treatments. Statistical analysis of the data was carried out by using standard analysis of variance (Panse and Sukhatme 1967) [7].

Result and Discussion

Effect of different nutrition on growth characters of Black gram

The results regarding plant height, number of functional leaves plant⁻¹, number of branches plant⁻¹ and total dry matter production plant⁻¹ of black gram were presented in table 1. Significantly maximum plant height (42.53 cm), number of branches (12.15), number of functional leaves plant⁻¹ (25.72), dry matter (20.47 g) were recorded due to application of RDF + Neem coated urea 2 percent + Salicylic acid (75 ppm) sprays at flower initiation which was found significantly

superior over the rest of treatments and remained at par on RDF+ Salicylic acid (75 ppm) spray at flower initiation and 7 days after 1st spray. The increases in plant height, number of branches, number of functional leaves plant and dry matter accumulation might be due to increased availability of nitrogen and other nutrients which enhanced production of photosynthetic assimilates from increased photosynthetic rate. Chandrashekar and Bangarusamy (2003) and Kalarani (1991) [5].

Effect of different nutrition on yield and yield attributing characters of Black gram

In relation of yield and yield contributing attributes which were significantly influenced by different treatments are presented in table 2. The treatment T₆ RDF + Neem coated urea 2 percent + Salicylic acid (75 ppm) sprays at flower initiation recorded significantly maximum values of number of pod plant⁻¹ (15.67), pod yield plant⁻¹ (7.07 g), no. of grains pod⁻¹ (7.87), grain yield plant⁻¹ (6.10), seed yield (810 kg ha⁻¹), straw yield (1676 kg ha⁻¹) and biological yield (2290 kg ha⁻¹) which was found significantly superior over the rest of treatments. The next best treatment was application of RDF+ Salicylic acid (75 ppm) spray at flower initiation and 7 days after 1st spray. The increase in yield may be attributed due to increase in all the growth and yield attributes. The better partitioning of sources to sink might have led to higher yield attributes, which finally resulted in higher seed yield of black gram. The result of present investigation is in line with those of Beg *et al.* (2013) [1], Das and Jana (2015) [3], Dixit and Elamathi (2007) [4], Mudalagiriappa *et al.* (2015) [6] and Thakur *et al.* (2017).

Table 1: Effect of different nutrition on growth characteristics of Black gram

Treatments	Height plant ⁻¹	leaves plant ⁻¹	branches plant ⁻¹	dry matter plant ⁻¹ (g)
T ₁ - RDF(25:50:00 NPK kg/ha).	36.97	20.70	9.50	15.67
T ₂ - RDF + Neem coated urea (2%) spray.	37.98	21.66	10.18	15.33
T ₃ - RDF + TNAU Pulse Wonder @ 5 kg/ha spray.	39.10	22.45	9.83	17.27
T ₄ -RDF + Salicylic acid (75ppm) Spray at flower initiation and 7 days after 1 st spray.	41.67	24.16	11.48	19.67
T ₅ - RDF + 19:19:19 (NPK) 2%.	40.23	23.45	10.83	18.58
T ₆ - RDF + Neem coated urea 2% + SA (75 ppm) sprays.	42.53	25.72	12.15	20.47
T ₇ - RDF + Boron @ 0.25 ppm spray.	37.37	22.99	9.87	18.22
T ₈ - RDF + Nitrobenzene @ 500 ppm spray.	37.26	22.39	9.48	18.00
T ₉ - RDF + NAA (50 ppm) spray.	36.38	23.46	9.66	15.67
SE ± m	1.27	0.80	0.53	0.75
C.D. at 5%	3.82	2.41	1.59	2.26
General Mean	38.83	23.00	10.33	17.65

*A.H- At harvest

Table 2: Effect of different nutrition on yield and yield attributing characters of Black gram.

Treatments	No. of pod plant ⁻¹	W.t of pod plant ⁻¹ (g)	No. of seed pod ⁻¹	Seed yield plant ⁻¹ (g)	100 seed weight (g)	Seed yield (kg ha ⁻¹)	Straw yield (kg ha ⁻¹)	Biological yield (kg ha ⁻¹)	Harvest Index (%)
T ₁ RDF (25:50:0NPKkg/ha).	11.3	6.07	6.3	5.20	4.47	536	1189	1725	31.12
T ₂ - RDF+ Neem coated urea (2%) spray.	12.6	6.33	6.8	5.50	4.77	646	1419	2065	31.35
T ₃ -RDF+TNAU Pulse Wonder @ 5 kg/ha spray.	13.3	6.17	6.7	5.33	4.53	680	1487	2167	32.52
T ₄ -RDF+Salicylic acid (75ppm) Spray at flower initiation and 7 days after 1 st spray.	14.0	6.65	7.0	5.73	4.73	770	1585	2253	34.12
T ₅ .RDF+19:19:19(NPK) 2%	12.7	6.53	6.9	5.67	4.70	755	1650	2307	33.05
T ₆ - RDF + Neem coated urea 2% + SA (75 ppm) sprays.	15.7	7.07	7.8	6.10	5.00	810	1676	2290	35.45
T ₇ - RDF + Boron @ 0.25 ppm spray.	11.67	6.27	6.3	5.57	4.57	563	1192	1754	32.02
T ₈ - RDF + Nitrobenzene @ 500 ppm spray.	11.7	6.15	6.5	5.24	4.57	547	1138	1685	32.48

T ₉ - RDF + NAA (50 ppm) spray.	12.7	6.16	6.6	5.47	4.53	547	1138	1625	33.87
SE ± m	0.72	0.20	0.29	0.21	0.09	49.67	64.83	132.87	2.66
C.D. at 5%	2.17	0.61	0.86	0.63	0.28	149.5	195.16	399.98	NS
General Mean	12.8	6.38	6.7	5.53	4.65	650.4	1385.9	1985.7	32.89

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