



## Effect of different rates of nitrogen and sulphur on growth attributes in Indian mustard. (*Brassica juncea L.*)

Himanshi Pandey<sup>1</sup>, RK Shukla<sup>2</sup>, TD Pandey<sup>3</sup>, Shani Raj<sup>4</sup>

<sup>1-4</sup> Department of Agronomy, BTC, College of Agriculture and Research Station, Bilaspur, Chhattisgarh, India

### Abstract

A field experiment was conducted at the research farm of BTC collage of agriculture and research station, Bilaspur, Chhattisgarh during *rabi* season of 2019-20 with a view to study and evaluate the influence of chemical fertilizers in combination with organic manure like FYM. The mustard variety Chhattisgarh sarson was used to grown and treatment were replicated three times in completed randomized block design. The investigation carried in nine treatment *viz.*, T<sub>1</sub> :- 100% RDF, T<sub>2</sub>:- 75% RDF +25% FYM, T<sub>3</sub> :- 50% RDF + 50% FYM, T<sub>4</sub>:- 100%+20 kg S, T<sub>5</sub>:- 75%RDF +25% FYM+40% S, T<sub>6</sub> :- 50%RDF +50% FYM +20 kg S, T<sub>7</sub>:- 100% RDF +30kg S, T<sub>8</sub> :-75% RDF +25% FYM+ 30 kg S and T<sub>9</sub>:- 50% RDF +50% FYM +30 kg S. the outcome of the investigation reveals that growth attributes *viz.*, Plant population/m<sup>2</sup> at 30 DAS, Plant height at 30, 60, 90 DAS, Dry weight of plant at 30, 60, 90 DAS, Number of branches/plant at 60 DAS, Crop growth rate 30-60, 60-90 DAS, Relative growth rate 30-60, 60-90 DAS. In mustard crop cultivated under Chhattisgarh plain condition. The treatment T<sub>3</sub> (50% RDF +50% FYM) showed significantly lower values for all of the above mentioned parameters. The treatment T<sub>7</sub> (100% RDF +30kg S) resulted the higher values for all of the above mentioned parameters. Treatment T<sub>7</sub> (100% RDF +30kg S) also come up with highest gross return (Rs. 81340.43/ha) and it was recorded at par with T<sub>4</sub> (100% RDF +20 kg S). The lowest or negative gross return (Rs.61010.84) and benefit cost ratio (B: C ratio) (2.69) were recorded in the treatment T<sub>3</sub> (50% RDF +50% FYM).

**Keywords:** FYM, mustard, seed yield, siliquae

### Introduction

Mustard (*Brassica juncea L.*) is an important oil seed crop next to groundnut in India. The seed contains about 40% oil and 23% protein. Mustard oil has a special fatty acid composition, i.e. 20-28% oleic acid, 10-12% linoleic, 9.0-9% linolenic acid 30-40% erucic acid. Rapeseed mustard oil is used primarily for cooking and these are species valued for vegetable, fodder, condiments and medicinal purposes. The Indian system of medicines referred to *Brassica campestris* as remedy for stomach, skin diseases and elephantiasis etc. Eruca oil is mostly used as lubricant.

In India mustard covers an area of 5977.16 ('000ha) with 8430('000tonnes) production and its productivity is 1410kg/ha (Ministry of Agriculture and farmer Welfare, 2017-18). In Chhattisgarh mustard covers an area of 43.43('000ha) with 18.11('000tonnes) production and its productivity is 415 kg/ha (Ministry of Agriculture and farmer Welfare, 2017-18.)

Oilseeds are energy rich crops and obviously the requirement of major nutrient is very high. Indian soil are becoming deficient in N, P, and K, along with S due to intensive cultivation and use of high analysis fertilizers, under such situation organic manures can be exploited to boost the soil health condition, production of crop and to improve fertilizer use efficiency. Nitrogen is the most important nutrient, which determines the growth of the mustard crop and increases the amount of protein and yield. Phosphorus and potash are known to be efficiently utilized in the presence of nitrogen. It promote flowering, setting of siliqua and increase the size of siliqua and yield (Singh and Meena 2004) <sup>[5]</sup>.

### Materials and Methods

The present investigation entitled "Integrated nutrient management in mustard (*Brassica juncea L.*)" was conducted during *Rabi* season of 2019 at the Agricultural Research Farm of Barrister Thakur Chhedilal College of Agriculture and Research Station, Bilaspur (Chhattisgarh). The detailed information of location, soil, climate and weather recorded during the crop season along with material used and methods employed are described in this chapter. Agro-climatically, the experimental site falls in dry moist, sub-humid region. Average (80 per cent) rainfall at the experimental site is 1500 mm (based on 80 years mean) per annum, major portion of which is received during monsoon season from June to September. The maximum and minimum temperature goes to 37.9°C and 8.5°C, respectively in the months of March and January.

During Rabi 2019, mean weekly minimum temperature ranged from 8.6°C in 2<sup>nd</sup> standard week (08-14<sup>th</sup> January) to 16.0°C recorded in 10<sup>th</sup> standard week (05-11<sup>th</sup> March) whereas, mean weekly maximum temperature ranged from 19.0°C in 6<sup>th</sup> standard week (05-11<sup>th</sup> February) to 29.7°C in 8<sup>th</sup> standard week (19-25<sup>th</sup> February). Total mean weekly rainfall of 11.4 mm was received during cropping period. Mean weekly maximum relative humidity ranged from 83% in 5<sup>th</sup> standard week (29-4<sup>th</sup> January) to 95.86% in 50<sup>th</sup> standard week (10-16<sup>th</sup> December), Mean weekly minimum relative humidity ranged from 49.8% in 4<sup>th</sup> standard week (22-28<sup>th</sup> January) to

68% in 1<sup>st</sup> standard week (1-7<sup>th</sup> January), Mean weekly of sunshine hours recorded in between 4.1 hours in 1<sup>st</sup> standard week (1-7<sup>th</sup> January) to 10.2 hours in 7<sup>th</sup> standard week (12-18<sup>th</sup> February). In general, overall a weather condition during experimental period was good and favorable for crop production.

### Results and Discussion

The application of integrated nutrient management significantly enhanced growth parameters viz. Plant population/m<sup>2</sup> at 30 DAS, Plant height at 30, 60, 90 DAS, Dry weight of plant at 30, 60, 90 DAS, Number of branches/plant at 60 DAS, Crop growth rate 30-60, 60-90 DAS, Relative growth rate 30-60, 60-90 DAS was recorded under T<sub>7</sub> 100% RDF +30Kg S. which was at par with treatment T<sub>4</sub> 100% RDF +20Kg S. and proved significantly superior over all other remaining treatments.

Plant population consistently superior at 30 DAS and at harvest, higher (548.00) and (531.67) was recorded under the treatment T<sub>7</sub>, followed by T<sub>4</sub> and lowest Plant population at (524.33) and (520.33) under the treatment T<sub>3</sub>. Significantly higher plant height at 30, 60, and 90 DAS consistently superior in higher (18.58 cm),

(136.33 cm) and (142.33 cm) was recorded under the treatment T<sub>7</sub>, followed by T<sub>4</sub> and minimum plant height (15.77 cm), (135.73 cm) and (138.73 cm) observed under treatment T<sub>3</sub>. Significantly higher dry weight of plant at 30, 60 and 90 DAS consistently superior in higher (27.90), (48.78) and (96.38) was recorded under the treatment T<sub>7</sub>, followed by T<sub>4</sub> and minimum dry weight of plant (21.60), (34.48) and (72.10) observed under treatment T<sub>3</sub>. Significantly higher number of branches per plant at 30 and 60 DAS consistently superior in higher (6.59) and (12.08) was recorded under the treatment T<sub>7</sub>, followed by T<sub>4</sub> and lower number of branches per plant (4.20) and (8.19) observed under treatment T<sub>3</sub>. Significantly higher crop growth rate at 0-30, 30-60 and 60-90 DAS consistently superior in higher (4.18), (12.68) and (5.20) was recorded under the treatment T<sub>7</sub>, followed by T<sub>4</sub> and lower crop growth rate (1.09), (1.28) and (1.15) observed under treatment T<sub>3</sub>. Significantly higher relative growth rate at 30, 60 and 90 DAS consistently superior in higher (49.33), (15.86) and (5.01) was recorded under the treatment T<sub>7</sub>, followed by T<sub>4</sub> and lower relative growth rate (41.18), (11.59) and (3.26) observed under treatment T<sub>3</sub>. (Table No. 1.1)

**Table 1:** All growth parameters table integrated nutrient management in mustard (*Brassica juncea* L.)

Treatments	Plant population		Plant Height			Dry Weight			Number of branches/plant		Crop growth rate			Relative Growth Rate			
	30 DAS	At Harvest	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	0-30 DAS	30-60 DAS	60-90 DAS	30 DAS	60 DAS	90 DAS	
	T1	100% RDF	532.33	530.33	17.34	122.83	126.13	24.79	44.78	86.30	5.29	9.29	2.30	5.70	3.60	45.2	14.50
T2	75% RDF +25% FYM	529.33	523.33	17.08	120.00	124.53	23.79	44.00	85.69	4.79	8.79	2.12	5.48	3.32	45.05	14.22	3.78
T3	50% RDF +50% FYM	524.33	520.33	15.77	113.83	115.03	21.60	34.48	72.10	4.20	8.19	1.09	1.28	1.15	41.3	11.59	3.26
T4	100% RDF +20Kg S.	543.33	536.33	18.10	135.73	138.07	26.20	47.50	92.28	6.09	11.29	3.10	8.53	4.48	47.18	15.65	4.80
T5	75% RDF +25% FYM +40 Kg S.	542.67	532.67	17.81	130.97	136.67	25.99	46.98	90.39	5.98	11.20	2.66	7.14	3.66	46.2	15.30	4.46
T6	50% RDF +50% FYM +20 Kg S.	527.33	524.67	16.60	119.90	123.23	22.98	35.10	74.78	4.43	8.39	1.24	2.00	1.72	42.8	12.08	3.58
T7	100% RDF +30Kg S.	548.00	545.00	18.58	136.33	142.33	27.90	48.78	96.38	6.59	12.08	4.18	12.68	5.20	49.33	15.86	5.01
T8	75% RDF +25% FYM +30Kg S	535.00	531.67	17.50	125.10	130.00	25.40	46.10	88.30	5.60	11.00	2.49	6.62	3.63	45.91	14.76	4.25
T9	50% RDF +50% FYM +30Kg S.	528.33	522.00	16.33	115.73	120.00	23.69	38.29	84.47	4.50	8.50	1.47	3.15	2.53	44.1	13.58	3.76
	SEm ±	15.75	13.80	0.55	5.04	5.61	1.17	2.20	3.44	0.38	0.59	0.17	0.46	0.25	1.46	0.85	0.29
	CD (5 %)	NS	NS	1.65	15.13	16.84	3.52	6.60	10.32	1.15	1.77	0.52	1.22	0.76	4.40	2.56	0.87
	CV (%)	5.10	4.51	5.54	7.02	7.58	8.22	8.89	6.96	12.63	10.37	13.16	12.03	13.44	5.62	10.42	12.30

### Conclusion

The application of integrated nutrient management significantly enhanced growth parameters viz. Plant population/m<sup>2</sup> at 30 DAS, Plant height at 30, 60, 90 DAS, Dry weight of plant at 30, 60, 90 DAS, Number of branches/plant at 60 DAS, Crop growth rate 30-60, 60-90 DAS, Relative growth rate 30-60, 60-90 DAS was recorded under T<sub>7</sub> 100% RDF +30Kg S. which was at par with treatment T<sub>4</sub> 100% RDF +20Kg S. and proved significantly superior over all other remaining treatments.

The maximum gross return (Rs.81340.42 ha<sup>-1</sup>) and net return (Rs.58655.42ha<sup>-1</sup>) was realized under T<sub>7</sub> (100% RDF +30Kg S) (100:60:40 kg ha<sup>-1</sup>NPK) followed by T<sub>4</sub>- (100%RDF +20Kg S) and T<sub>5</sub> (75% RDF +25% FYM + 40 Kg S).which were approximately similar trend in gross and net return. On the basis of above findings, treatment T<sub>7</sub> (100% RDF +30Kg S) stand first in position and T<sub>4</sub>- (100%RDF + 20Kg S) stand in second order of preference. However, treatment T<sub>5</sub> comes in next in order. There for it may be concluded that treatment T<sub>7</sub> (100% RDF +

30Kg S) may be prefer for integrated nutrient management in mustard.

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