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# Integrated nutrient management (INM) on yield and quality of Black Gram (*Vigna mungo* L.)

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**Abstract**
In order the explore the possibility of incresing yield, quality and economics of black gram (*Vigna mungo* L.) Therefore, the present investigation was conducted during Kharif season of 2019-2020 at the instructional farm, AKS University, Sherganj, Satna by adopting RBD design. Among the treatment appication of 100% RDF (20:40:20 Kg. NPK/ha) was one of the important INM treatment which further caused pronounced response towards enhancement of yield, quality and economics of black gram. The heighest grain yield (12.83 Kg/ha), straw yield (38.00 Kg/ha), Biological yield (50.83 Kg/ha), harvest index (25.22%), protein content (24.85%), Cost of cultivation (22053 Rs.), Gross monetary return (80731 Rs.), Net monetary return (63456 Rs), Benefit cost ratio (1:3.67) were recorded when 100% RDF (20:40:20 NPK Kg/ha) was applied in Black gram.

**Keywords:** Black gram, INM, yield and attributes and economics of production

## Introduction
Black gram (*Vigna mungo* L.) also known as urd bean being early maturing and short-duration pulse crop is being grown in an area of 31.9 lakh ha. With a production of 19.0 lakh tonnes and productivity of 596 kg/ha (Krishnaprabhu *et al.* 2018) [10]. Black gram is a self-pollinated leguminous crop which is grown during kharif as well as summer seasons in arid and semi-arid rgions of India.
Integrated nutrient management imporve soil fertility, productivity and many other agronomic aspects of crop production, such as water retention capacity in the soil and disease and pest control, all of which would contribute to increase the crop yields. The appropriate combination of chemical fertilizers and organic manure with biofertilizers may be feasible and visible to sustain agriculture as commercial and profitable crop without deterioration in quantity and quality of the produce.

## Material and Method
A field experiment was carried out at experimental farm, AKS University, Satna during 2019-20. The soil based on chemical compstion low in organic carbon (0.43 g.), Available nitrogen (176.5 kg/ha.), Available phosphorous (12.4 kg/ha), available potassium (200.0 kg/ha) with soil pH (7.5) and electrial conductivity (0.16 ds/m). The soil sample based on pH, electrical conductivity, Organic carbon content, available N, P, K. The experiment was laid out in Randomized Block Design with nine treatments and three replications. The treatment used was as follows; Control, 100% RDF (20:40:20 NPK kg/ha); (90% RDF +2t FYM/ha); (45% RDF +4t FYM/ha); (50% RDF + 5t FYM/ha); (45% RDF + 4t FYM/ha+Rhizobium); 45% RDF+6t FYM/ha+800 g. Molybdenum/ha); (2t FYM/ha+Rhizobium+ 800g. Molybdenum/ha); (4tFYM/ha+Rhizobium+800 g. Molybdenum/ha).

**Table 1:** Yield and quality of black gram due to use different INM treatment

| Treatment | Grain yield (Kg/ha) | Straw yield (Kg/ha) | Biological yield (Kg/ha) | Harvest index % | Protein content (%) | Cost of cultivation (Rs/ha) | Gross monetary return (Rs/ha) | Net monetary return (Rs/ha) | B:C ratio |
|---|---|---|---|---|---|---|---|---|---|
| $T_1$ =Control | 7.33 | 26.98 | 34.31 | 21.39 | 20.97 | 14690 | 47177 | 32487 | 1:2.21 |
| $T_2$= 100% RDF (20:40:20 NPK kg/ha) | 12.83 | 38.00 | 50.83 | 25.22 | 24.85 | 22053 | 80731 | 63456 | 1:3.67 |
| $T_3$= 90% RDF +2t FYM/ha | 11.39 | 35.77 | 47.16 | 24.15 | 23.52 | 19016 | 72077 | 53061 | 1:2.79 |
| $T_4$= 45% RDF +4t FYM/ha | 8.35 | 30.04 | 38.39 | 24.76 | 21.62 | 20913 | 53603 | 33750 | 1:1.70 |
| $T_5$= 45% RDF + 5t FYM/ha+Rhizobium | 8.58 | 30.86 | 39.44 | 21.73 | 21.74 | 20042 | 55078 | 34165 | 1:1.63 |
| $T_6$= 50% RDF + 4t FYM/ha+Rhizobium | 9.63 | 33.15 | 42.78 | 22.52 | 23.24 | 22053 | 61521 | 41479 | 1:2.07 |
| $T_7$= 45% RDF+6t FYM/ha+800 gm. Molybdenum/ha | 10.15 | 34.18 | 44.33 | 22.88 | 23.27 | 16950 | 64691 | 42638 | 1:1.93 |
| $T_8$= 2t FYM/ha+Rhizobium+800gm.Molybdenum/ha | 7.58 | 26.99 | 34.58 | 21.94 | 21.49 | 17275 | 48604 | 31654 | 1:1.87 |
| $T_9$= 4tFYM/ha+Rhizobium+800 g. Molybdenum/ha | 7.67 | 27.03 | 34.70 | 22.12 | 21.55 | 18950 | 49125 | 30175 | 1:1.59 |
| S.Em + | 0.27 | 0.62 | 0.80 | 0.42 | 0.42 | -- | -- | -- | -- |
| CD (P= 0.05) | 0.79 | 1.82 | 2.34 | 1.23 | 1.23 | -- | -- | -- | --- |

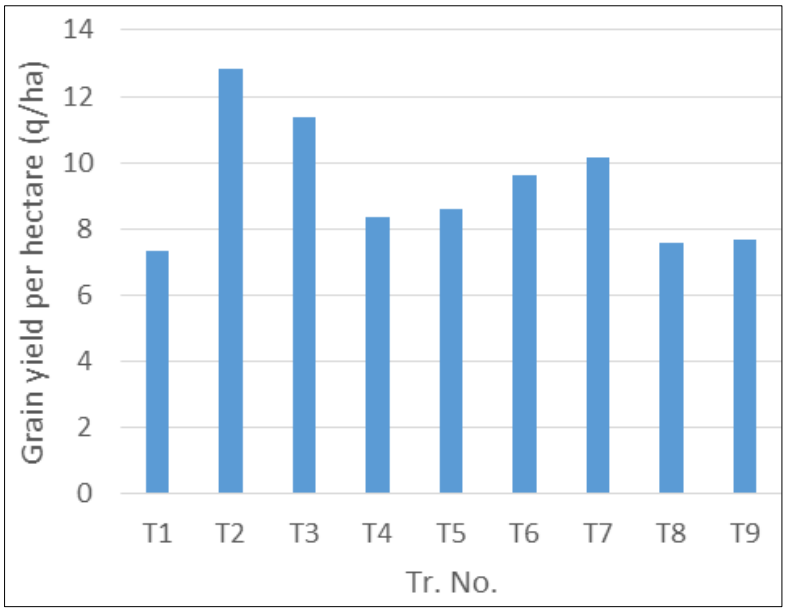


**Fig 1:** Grain yield per hectare of black gram as influenced by different integrated nutrient management treatments (q/ha)

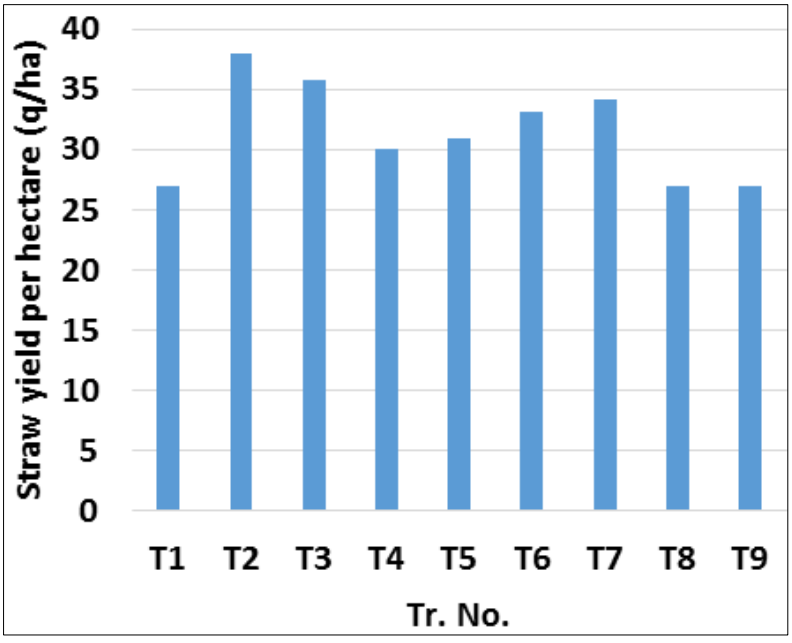


**Fig 2:** Straw yield per hectare of black gram as influenced by different integrated nutrient management treatments (q/ha)

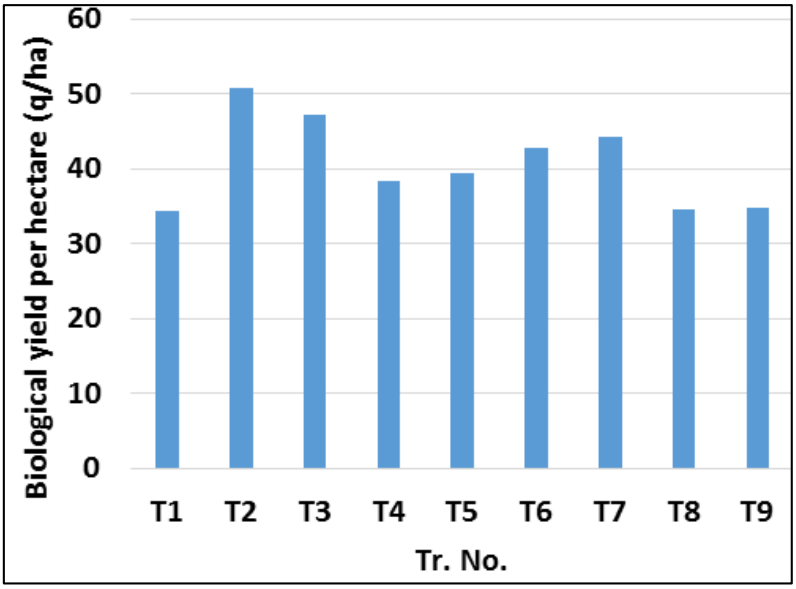


**Fig 3:** Biological yield per hectare of black gram as influenced by different integrated nutrient management treatments (q/ha)

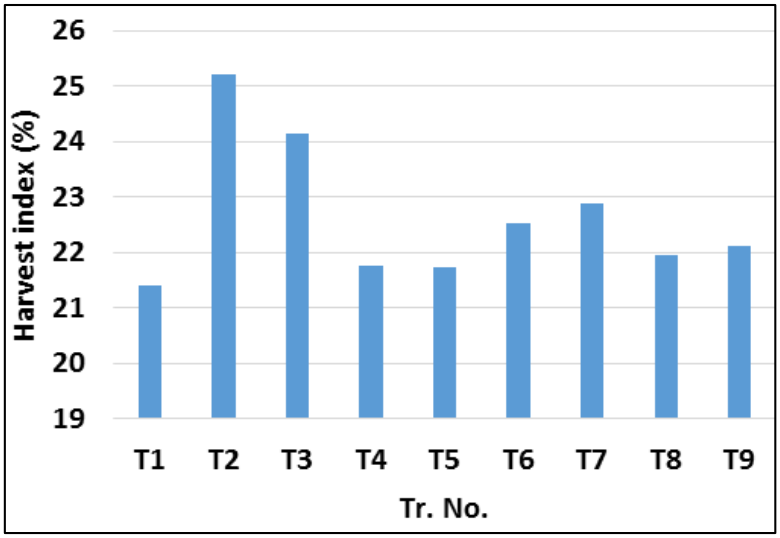


**Fig 4:** Harvest index of black gram as influenced by different integrated nutrient management treatments (%)

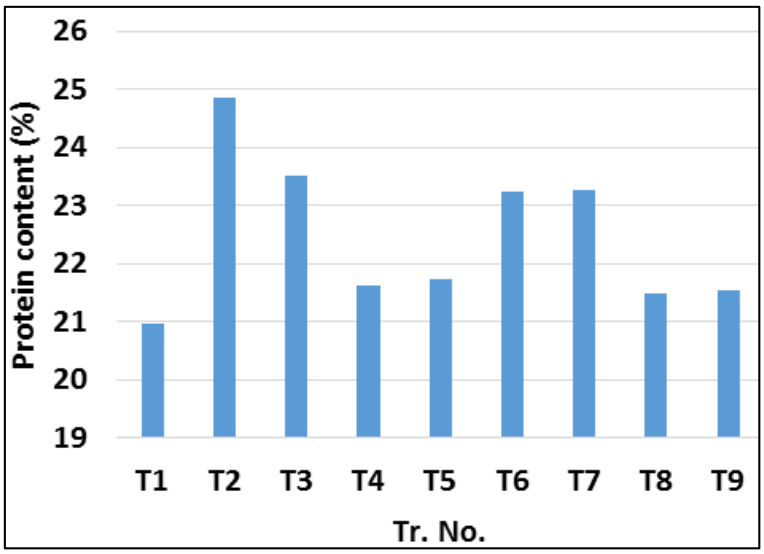


**Fig 5:** Protein content of black gram as influenced by different integrated nutrient management treatments (%)

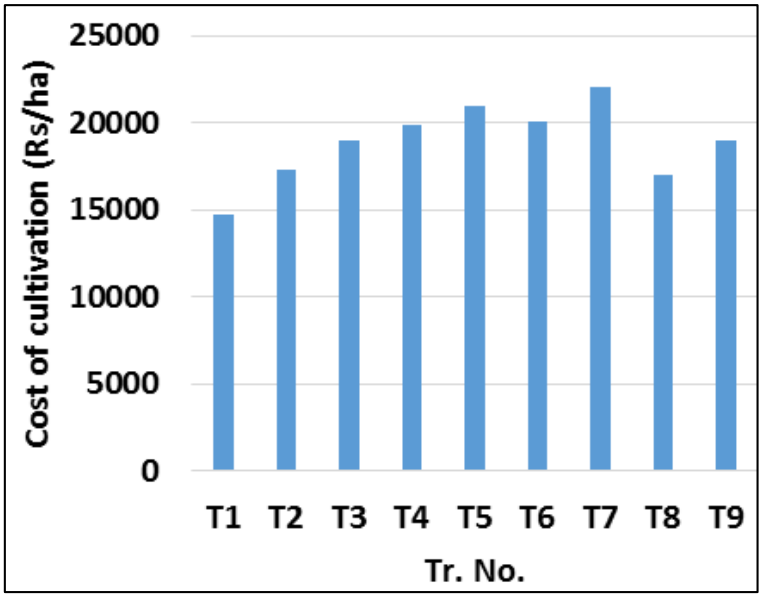


**Fig 6:** Cost of cultivation of black gram as influenced by different integrated nutrient management treatments (Rs/ha)

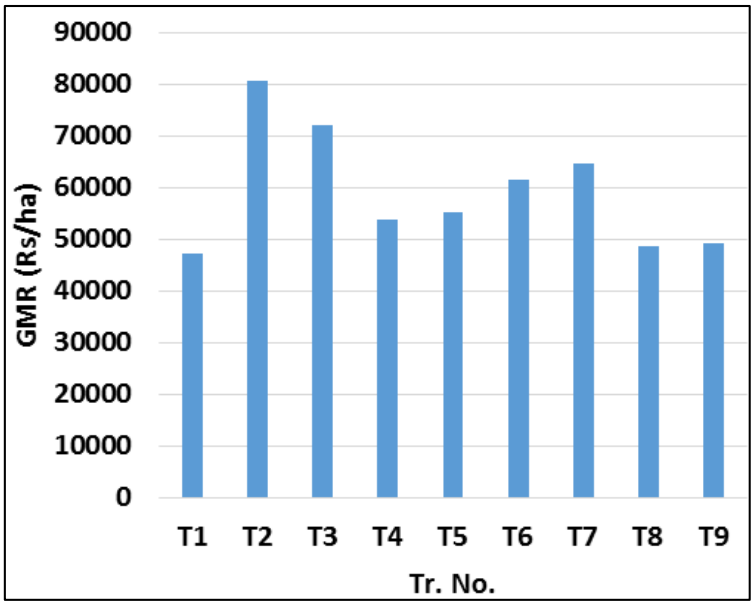


**Fig 7:** Gross monetary return (GMR) of black gram as influenced by different integrated nutrient management treatments (Rs/ha)

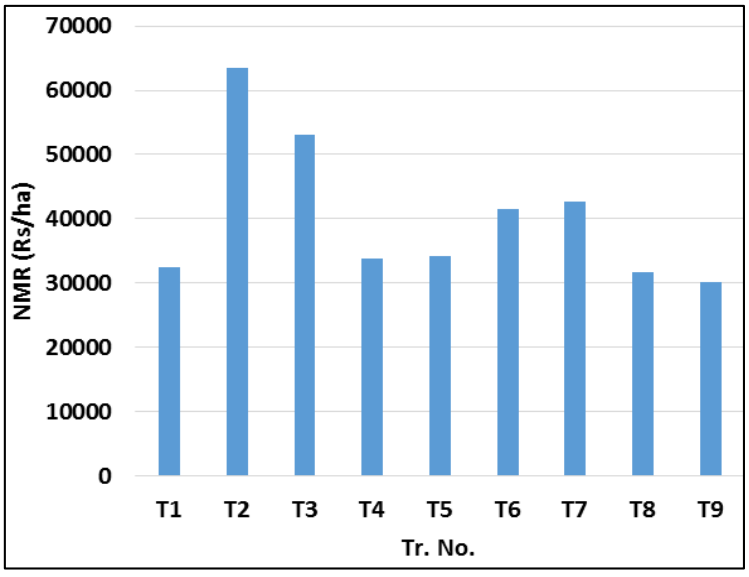


**Fig 8:** Net monetary return (NMR) of black gram as influenced by different integrated nutrient management treatments (Rs/ha)

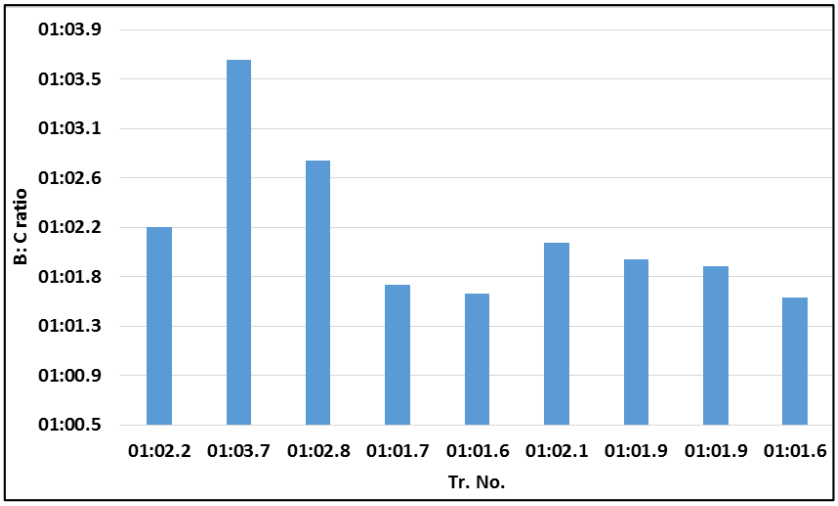


**Fig 9:** B: C ratio of black gram as influenced by different integrated nutrient management treatments

## Result and Discussion

An examination of date protrayed in table – 1 obviously indicated the use of different INM treatment and brought tremendous increase in yield, and yield attributes such as grain yield q/ha (12.83), straw yield (38.00 q/ha) was noticed by the use of 100% RDF (20:40:20 NPK/ha). However, biological yield (50.83 Kg/ha) was also pushedup tremendously when 100% RDF that is 20:40:20 NPK/ha was incorporated. The quality parameters such as protein content was also obviously enhanced due to use of 100% RDF NPK (20:40:20 NPK/ha). Economics of cost of production was also further obtained that maximum cost of cultivation i.e. 22053 rupees/ha was involved by the application of 100% RDF (20:40:20 Kg NPK/ha). However maximum cross monetary returns ie (80731 Rs/ha), Net monetary returns Rs (63456 Rs/ha) and B:C ratio i.e (1:3.67) due to use of 100% RDF (20:40:20 kg NPK/h

## Summery and Conclusion

1. The significant higher yield (q/ha), straw yield (q/ha) and biological yield per/ha of black gram was recorded under the application of 100% with respective values of 12.83 q., 38.00 q. and 50.83 q/hq respectively which proved to be significantly superior to rest among the treatment.
2. The significant highest harvest index of black gram was recorded under the application of 100% RDF with respective value of 25.22% which proved to be significantly superior to rest among the treatment.
3. The significant heighest protein content of black gram was recorded under the application of 100% RDF with the respective value of 24.85% which proved to be significantly superior to rest among the treatment.
4. The significant heighest cost of cultivation 22053.00/ha was recorded under the application of 45% RDF+6t FYM/ha+molybdenum@800 g/ha, while height gross monetary return (80731.00/ha), Net monetary return (63456.00/ha) and B:C ratio of 1:3.67 of Black gram was recorded under the application of 100% RDF, respectively which proved to be significantly superior to rest among the treatment.

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