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Effect of inorganic fertilizers and FYM on yellow mustard (*Brassica campestris* L.) Cv, an economic analysis

Akash Swamy, David AA and Soman Singh Dhruw

Abstract
A study was conducted in Soil Science Research Farm, Sam Higginbottom Institute of Agriculture Technology & Sciences Deemed-to-be-University. During Rabi season 2014-15 on the response of inorganic fertilizers and FYM on Yield attributes of Yellow Mustard. The result indicates that application of 100% recommended dose of inorganic fertilizers (NPK &S) and FYMha^{-1}increased the total cost of cultivation of yellow mustard markedly. The maximum total cost of cultivation (Rs.74460 ha^{-1}) and the highest net return (Rs.47496 ha^{-1}) with highest cost benefit ratio (1:2.76) was computed with application of 100 per cent recommended dose of fertilizers (NPK &S) and also FYM ha^{-1} in treatment T_8 (*i.e.*N@80kg + P@60kg + K@40kg & S@40kg and FYM 10t ha^{-1}) followed by net profit of Rs.34776 with cost benefit ratio of (1:2.74) was recorded with 50% recommended dose of fertilizers application of NPK&Sha^{-1}and 0% application of FYM. Hence, there should be a chance of better yield and net income, suggested application inorganic fertilizers and FYM timely for this crop because time is a very important factor and play great role for greater yield and its quality, before time or after time any operations in the field of agriculture production and quality will goes down. However, since these findings are based on one-year experiment and therefore, further research may be conducted to substantiate it under Allahabad agro climatic conditions.

Keywords: Nitrogen, phosphorus, potassium, sulphur and FYM yellow mustard, economic analysis

Introduction
Rapeseed (*Brassica campestris* L.) vegetable oils are preferred over the solid animal fats because of health benefits extraction of seed oil is high, with average oil content of 42% and a protein content of approximately 21% rapeseed has the lowest saturated fat content of any vegetative oil. (Declercq and Daun, 1999) [4]. The global production of rapeseed-mustard was 62.45mt and 33.64 mha with a total productivity of 18.556 q ha^{-1}(FAO STAT, 2011) [5].
The total area in India under rapeseed-mustard crop is 64.54 lakh hectares and total production is 72.82 lakh tones during 2013–14 (Anonymous, 2015) [1]. Rapeseed-mustard is mainly grown in North-West parts of India. Rajasthan and Uttar Pradesh are the major producing states in the country. The production from Rajasthan is highly monsoon dependent. In Uttar Pradesh, rapeseed-mustard crop occupies an area of 10.26 lakh hectares and production of 11.29 tonnes (Anonymous, 2015) [1]. Nearly 76% oilseeds area is rainfed which is often subjected to erratic monsoon. Nitrogen is the most important nutrient, which determines the growth of the mustard crop and increases the amount of protein and the yield. Phosphorus and potash are known to be efficiently utilized in the presence of nitrogen. It promotes flowering, setting of siliqua and in increase the size of siliqua and yield (Bharose *et al*., 2011) [2]. Phosphorus is generally deficient in majority of our Indian soils and need much attention for maintenance of soil fertility Phosphorus plays a vital role in photosynthesis, respiration, cell conclusion cell enlargement and several other processes in living plants.
Rapeseed is an important oil seed crop of arid and semi-arid region. Potassium is required for improving the yield and quality of different crops because of its effect on photosynthesis, water use efficiency and plant tolerance to diseases, drought and cold as well for making the balance between protein and carbohydrates (Singh *et al*., 2012) [7]. Sulphur is also an important nutrient and plays an important role in physiological functions like synthesis of cystein, methionine, chlorophyll and oil content of oil seed crops. FYM is one of the oldest methods of manure used by the farmer for growing crops, because of its early availability and presence of almost all the nutrient required by plant. (Katyayan, 2010) [6].

Materials and Methods
Field experiment was conducted on the Soil Science research field of SHIATS-DU-Allahabad (U.P) during Rabi season of 2014-15.

The treatment combinations are summarized in table.1 yellow mustard (*Brassica campestris* L.) Cv. Ulhas MYSL 203 was tested for three levels of N 80kg + P 60kg + K 40kg & S 40kg and FYM 10 t ha^{-1}. Irrigation scheduling, fertilizers application and intercultural operation are followed as per normal agronomic practices. The experiment was laid out in 2x2 m 3^2 factorial R.B.D with nine treatments and three replications. Seed yield was recorded at harvest for all the treatments and at harvest of crops for textural classes, pH, EC as per standard laboratory methods.

Particulars of the treatments

Treatments	Levels of N P K and S (kg ha^{-1})	Symbol used
Levels of N P K & S	@ 0% N P K & S	L_0
	@ 50% N P K & S	L_1
	@100% N P K & S	L_2
Levels of FYM	@ 0% FYM	F_0
	@ 50% FYM	F_1
	@ 100% FYM	F_2

Statistical analysis and interpretation of data

The analysis and interpretation of data were studied using the Fischer's method of analysis of variance technique as described by Gomez and Gomez (1984). The level of significance used in 'F' and 't' test was P = 0.05. Critical difference values were calculated wherever the 'F' test was significant.

Economic analysis

Cost of cultivation was worked out on per hectare basis. Based on the prevailing price of inputs used and produce obtained during the year (2013-14), economics of different treatment combinations was worked out by taking into account the cost of cultivation and sale value of produce. The gross income, net profit per hectare and benefit cost ratio were worked out by using the following formulae for each treatment combination:

- Gross income (` $ha^{-1}$) = Cost of yellow mustard seed (` ha^{-1}) + Cost of stover (` ha^{-1}).
- Net return (` ha−1) = Gross income (` ha^{-1}) − Total cost of cultivation (` ha^{-1}).
- Benefit: Cost = Net return (` ha^{-1}) / Total cost of cultivation (ha−1).

Soil sampling and analysis

Soil samples from each plot at 0-15cm depth were collected at different stages were air- dried, grind and passed through 2mm sieve and finally stored in polythene bags for analysis of different physico-chemical parameters and changes in available NPK and S content. The soil sample was analysed for Bulk density (g cm^{-3}), Particle density (g cm^{-3}), % Pore space, pH (1:2) w/v, EC (dsm^{-1}), % Organic carbon, Available N P K and S.

Results and discussion

Table 1: Response of inorganic fertilizers and FYM on Cost Benefit Ratio (C: B) of different Treatments combination of yellow mustard

Treatment combination	Yield (qha^{-1})	@Rs q^{-1} yield	Gross return (Rs ha^{-1})	Total Cost of Cultivation (Rs ha^{-1})	Net return	C:B
T0=L0F0	10.0	3400	35700	16087.00	19613	1:2.11
T1=L0F1	12.5	3400	42500	19587.00	22913	1:2.16
T2=L0F2	13.3	3400	45220	23087.00	22133	1:1.95
T3=L1F0	13.9	3400	47260	18025.00	29235	1:2.62
T4=L1F1	15.6	3400	53040	21525.00	31515	1:2.46
T5=L1 F2	16.0	3400	54400	25025.00	29375	1:2.17
T6=L2 F0	16.1	3400	54740	19964.00	34776	1:2.74
T7=L2F1	17.9	3400	60860	23464.00	37396	1:2.59
T8=L2F2	21.9	3400	74460	26964.00	47496	1:2.76

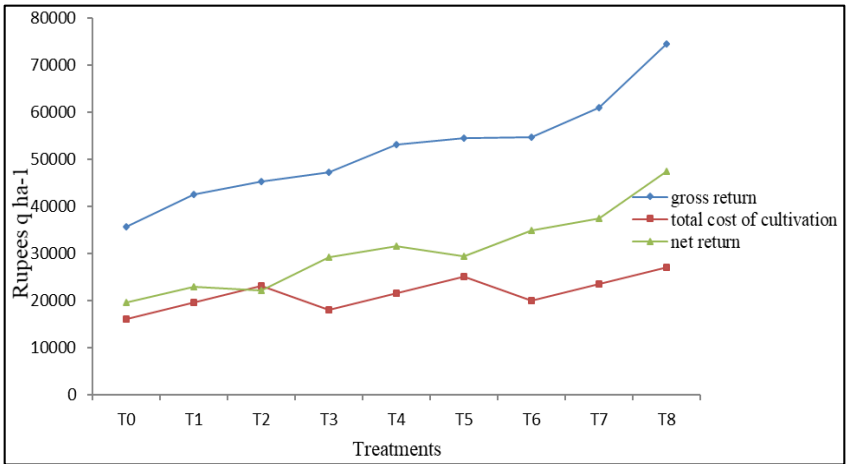

Fig 1: Response of different levels inorganic fertilizers and FYM on gross return total cost and net return (R ha^{-1}) values of yellow mustard (*Brassica campestris*)

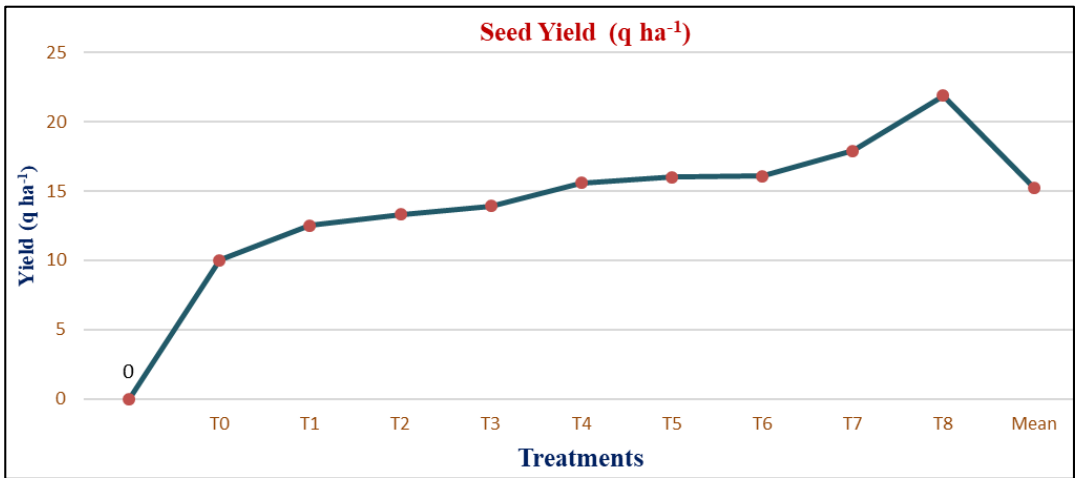

Fig 2: Response of inorganic fertilizers and FYM on yield of yellow mustard (*Brassica campestris* L.)

The data given in Table 1 & Fig 1 indicates that, the treatment T_8- L_2F_2 (@ 100%NPK & S + @ 100% FYM) provided highest net profit of Rs.47496 with highest benefit cost ratio of (1:2.76) followed by net profit ofRs.34776 with benefit cost ratio of (1:2.74) was recorded intreatmentT6-L2F0 @100% NPK & S + @ 0% FYM) and net profit of Rs. 29235 with benefit cost ratio of (1:2.62) recorded in treatment T3-L1F0 @ 50% NPK & S+@0% FYM. The minimum net profit of Rs.19613 was recorded in the treatment T_0- L_0F_0 (@ 0%NPK & S + @0% FYM) (i. *e.* control) with cost benefit ratio of (1:2.11). Similar results have also been recorded by Bhore *et al.* (2007) [3].

Conclusion

The maximum net return (Rs.47496 ha^{-1}) and also cost benefit ratio (1:2.74) was recorded with application of 100 per cent recommended dose of fertilizers (NPK & S) and also FYM ha^{-1} in treatment T8 combination. The minimum net profit of was recorded with no application of inorganic fertilizers and FYM. Hence there should be a chance of better yield and net income, suggested application inorganic fertilizers and FYM timely for this crop.

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