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Response of mulching and nutrient management practices yield under different cropping system

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Abstract
The present experiment was conducted during two consecutive years of kharif and Rabi seasons of 2017-18 and 2018-19 at Students Instructional Farm (SIF) of C.S.A. University of Agriculture and Technology, Kanpur, entitled " Response of mulching and nutrient management practices on growth and yield under different cropping system" The treatments were comprises of three cropping systems (Maize-Wheat, Maize-Field Pea and Maize-Mustard), two moisture conservation practices (Mulching and No mulching) and three nutrient management treatments (100% RDF, 85% RDF+2.5 tonne/ha FYM and 70% RDF+5.0 tonne/ha FYM application of FYM only in *kharif* season). The field experiment was laid out in Split Plot Design and replicated thrice. The response of cropping system was evaluated on yield. Among the different cropping system the biological yield, grain yield and straw yield found non-significant difference. Under moisture conservation practices mulching recorded maximum grain yield and straw yield and combination of 85% RDF+2.5 tonne/ha FYM were found superior over other treatment Combinations.

Keywords: cropping system, mulching and FYM

Introduction
The resource conservation technology primarly focus on resource saving through minimal tillage ensuring soil nutrients and moisture conservation through crop residue and growth of cover crops and adoption of spatial and temporal crop sequencing. These pro-sustainable technologies and practices therein have long been practiced by the farmers in the indo Gangatic Plains but got eroded in recent times. With squeezing net returns and increasing threats of sustainability the viability rice-wheat farming is looming large. These issue are being discussed and concern are being raised by the planners and policy makers. The adoption of RCTs is expected to yield benefits to the farmer's in terms of reduced losses due to soil erosion, saving of energy and irrigation costs, increased productivity and water use efficiency, increased nutrient use efficiency and adoption of new crop rotations. Mulching is the technique of covering the soil surface around the plant with an organic or synthetic mulch create favourable conditions for the plant growth and proficient crop production. (Chakrabarti *et al.* 2008; Kedar *et al.* 2017) [1, 3]. Mulching helps to improve crop growth as well as yield and at the same time it optimizes water use (Yu *et al.* 2018). Maize based cropping system has wide adaptability and compatibility under diverse soil and climatic conditions. Hence it is cultivated in sequence with different crops under various agro-ecologies of the country. Among different maize based cropping systems, maize-wheat is the 3rd most important cropping systems (after rice-wheat and rice-rice that contributes about 3% in the national food basket). The other major maize systems in India are maize-mustard, maize-chickpea, maize-maize, has emerged a potential maize based cropping system in peninsular and eastern India compared to existing cropping systems like rice-wheat and rice-rice, maize based cropping systems are better user of available resources.

Materials and methods
Geographically, the region falls under sub-tropical zone of indo-gangetic alluvial of central Uttar Pradesh in India. The annual rainfall of this region is about 890 mm. Most of the rains are received from mid June to the end of the September. Out of the total annual rainfall, about 85-90 percent of rainfall received during South westerly monsoon (June to September). The onset of monsoon prevails during third week of June. The winter months are cold and dry and occasional frost occurs during the period. The temperature starts rising from the month of February onwards and continue to rise up to June. The temperature in the month of May to June may go up to the 44-47 ^{0}C. The hot winds blow from South-West to North-East during summer.

During the experimentation kharif season received total rainfall of 567.1 mm and 895.13 mm during 2017 and 2018, respectively. Similarly, the winter crop in *rabi* season received total rainfall of 15.8 mm and 38.00 mm during 2017-18 and 2018-19 respectively. The kharif crops expose to minimum temperature ranging 23.3 ^{0}C to 26.3 ^{0}C in 2017 and 20.6 ^{0}C to 27.5 ^{0}C in 2018, while facing maximum temperature ranging 29.4 ^{0}C to 36.2 ^{0}C in 2017 and 28.5 ^{0}C to 38.2 ^{0}C during 2018. The rabi crop exposed to solar radiation of minimum temperature ranging 5.3 ^{0}C to 2.4 ^{0}C during 2017-18 and 5.3 ^{0}C to 22.1 ^{0}C during 2018-19, while exposed maximum temperature ranging 17.0 ^{0}C to 39.4 ^{0}C in 2017-18 and 19.6 ^{0}C to 39.4 ^{0}C during 2018-19. The soil of experimental field was originated from alluvial deposits. The soil type and fertility status was determined by the mechanical and chemical analysis of the soil.

Experimental details

The experiment was laid out in split plot design and replicated thrice with three cropping system *viz*. Maize-Wheat, Maize-Field Pea and Maize-Mustard, two moisture conservation practices (Mulching and No mulching) and three nutrient management treatments (100% RDF, 85% RDF+2.5 tonne/ha FYM and 70% RDF+5.0 tonne/ha FYM application of FYM only in *kharif* season). The crop was fertilized as per the treatment. The recommended dose of nitrogen, phosphorus and potassium @ 150 kg, 60 kg and 40 kg ha^{-1} for maize and wheat, 20 kg, 60 kg, and 40 ka ha^{-1} for field pea and 80 kg, 60 kg, and 40 ka ha^{-1} for mustard respectively. Urea, DAP, Murate of potash, FYM were used as the source of nitrogen, phosphorus and potassium. Mulching was done once at 20 DAS manually with the help of paddy straw was placed between the rows in the earmarked plots.

Result and discussion

Yield of different crop influenced by different factors

Among the different cropping system the biological yield, grain yield and straw yield found non-significant difference**.** Under the moisture conservation practices mulching recorded maximum biological yield (21001.70 kg/ha, 12629.60 kg/ha, 3789.30 kg/ha and 7176.40 kg/ha, in maize, wheat, field pea and mustard, respectively) compared to no mulch treatment. Among the nutrient management treatments, the maximum biological yield recorded under 85%RDF +2.5 t/ha FYM (20322.20 kg/ha, 11986.20 kg/ha, 3635.00 kg/ha and 6845.30 kg/ha in maize, wheat, field pea and mustard, respectively) compared to 70% RDF +5.0 t/ha FYM and 100%RDF treatment (Gaur, B.L. and Kumawat, S.K. (2004) [2].

Organic mulch treatment registered increment in grain yield (3.09%, 7.30%, 7.82% and 6.28%in maize, wheat, field pea and mustard, respectively) compared to no mulch treatment. The organic mulch not only conserve soil moisture but also lead efficient utilization by crop plants with the suppression of weed germination and growth. The combination of mineral + organic nutrition (85%RDF + 2.5 tonne/ha FYM) significantly increase grain yield (10.83%, 17.90%, 20.47% and 11.74% in maize, wheat, field pea and mustard, respectively) compared to 70% RDF + 5 tonne/ha FYM treatment. This combination of mineral + organic source of nutrition also proves its superiority over only mineral nutrition provided through 100% RDF treatment. The result is corroborated with the findings of Kumawat (2004) and Manjhi *et al.* (2016) [5].

In moisture conservation practices organic mulch established its usefulness in significant improvement in straw yield. The magnitude of variation evaluated (3.23%, 5.56%, 6.24% and 6.62% in maize, wheat, field pea and mustard, respectively) in straw yield of wheat compared to no mulch treatment.The treatment 85% RDF + 2.5 tonne/ha FYM registered significant improvement in yield compared 70% RDF + 5 tonne/ha FYM treatment. The magnitude of variation evaluated (13.08%, 11.70%, 14.09% and 7.38% in maize, wheat, field pea and mustard, respectively) in straw yield of wheat compared to 70% RDF + 5 tonne/ha FYM treatment. Similar findings were reported by Prasad *et al.* (2003) [6], Verma *et al.* (2011) [10] and Singh *et al.* (2011) [9].

Table 1: Effect of different treatments on yield of different crops

Treatments	Biological yield (kg/ha)				Grain yield (kg/ha)				Straw yield (kg/ha)			
	Maize	Wheat	Field pea	Mustard	Maize	Wheat	Field pea	Mustard	Maize	Wheat	Field pea	Mustard
A. Cropping system												
Maize-Wheat	20498.80				4509.50				16005.70			
Maize-Field pea	20892.20				4581.40				16323.30			
Maize-Mustard	20641.30				4524.40				16116.80			
SEd±	231.40				64.30				212.20			
CD at 5%	NS				NS				NS			
B. Moisture conservation practices												
Mulching	21001.70	12629.60	3789.30	7176.40	4609.70	4792.20	1890.30	1887.20	16405.90	8035.80	1891.80	5309.80
No mulching	20353.20	12026.70	3580.00	6751.20	4467.20	4466.20	1753.00	1775.70	15891.30	7612.20	1780.70	4980.30
SEd±	145.80	92.10	43.80	82.30	43.60	47.60	46.60	33.90	141.30	57.00	32.70	52.80
CD at 5%	317.60	255.60	121.60	228.50	95.60	132.30	129.30	94.00	307.90	158.40	90.80	146.50
C. Nutrient management												
100% RDF	20322.20	11986.20	3635.00	6845.30	4421.10	4493.10	1777.30	1793.00	15901.10	7674.00	1847.30	5059.60
85% RDF + 2.5 t/ha FYM	21927.00	13121.80	3919.00	7303.20	4879.10	5083.20	2015.00	1953.20	17055.40	8335.80	1951.20	5372.40
70% RDF + 5.0 t/ha FYM	19783.10	11876.40	3500.00	6742.90	4314.60	4311.20	1672.80	1748.00	15489.30	7462.20	1710.30	5003.30
SEd±	202.70	130.70	71.10	112.50	58.50	75.90	63.60	45.10	191.60	94.90	46.80	78.80
CD at 5%	427.70	277.00	150.70	238.50	123.50	160.80	134.90	95.70	404.20	201.10	99.20	167.10
D. Interactions												
A×B×C												
SEd±	496.50	184.80	100.50	159.10	143.30	107.30	90.00	63.80	469.20	134.20	66.20	111.40
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Conclusion

It is concluded that the highest yield under different cropping system were found under mulching and 85% RDF + 2.5 tonne/ha FYM treatments combinations as compared to no mulch and 70% RDF + 5.0 tonne/ha FYM treatments.

References

1. Chakrabarty D, Nagarjun S, Aggarwal P. Gupta VK, Tomar RK, Garg RN, *et al*. Effect of mulching on soil and plant water status and the growth and yield of wheat (*Triticum aestivum* L.) in a semi-arid environment. Agric. Water Manag 2008;95:1323-1334.
2. Gaur BL, Kumawat SK. Evaluating integrated nutrient management and in situ Moisture conservation in Rainfed maize (*Zea mays* L.) production system. Indian Journal of Dryland Agriculture Research and Development 2004;19(1):91-93.
3. Kader MA, Senge M, Majid MA, Ito K. Recent advances in mulching material and methods for modifying soil environment. Soil tillage Res 2017;168:155-166.
4. Kakraliya SK, Naveen Kumar, Sucheta Dahiya, Sandeep Kumar, Yadav DD, Mohinder Singh, *et al*. Effect of integrated nutrient management on growth dynamics and productivity trend of wheat (*Triticum aestivum* L.) under irrigated cropping system. Journal of Plant Development Sciences 2017;9(1):11-15.
5. Manjhi RP, Mahapatra P, Shabnam S, Yadava MS. Long term effect of nutrient management practices on performance of quality protein maize under maize (*Zea mays*)-wheat (*Triticum aestivum*) cropping sequence. Indian Journal of Agronomy 2016;61(4):436-442.
6. Prasad Shatrughan, Dixit RS, Sharma G. Productivity of late-sown wheat (*Triticum aestivum* L.) varieties as influenced by combined application of inorganic and organic sources of nitrogen. Crop Research (Hisar) 2003;26(2):370-373.
7. Qureshi Fozia, Uzma Bashir, Ali T. Effect of integrated nutrient management on growth, yield attributes and yield of field pea (*Pisum sativum* L) cv. Rachna. Legume Research 2015;38(5):701-703.
8. Reddy GN Kishore, Singh Rajesh. Effect of integrated nitrogen management on the growth and yield of mustard (*Brassica juncea* L.). Journal of Pharmacognosy and Phytochemistry 2018;7(3):617-619.
9. Singh RP, Pal Yesh, Singh Harpreet. Effect of organic and inorganic sources of nutrients on growth, yield and quality of Indian mustard (*B. juncea* L.) under late sown condition. Pantnagar Journal of Research 2011;9(2):308-310.
10. Verma CK, Yadav DD, Kushwaha KP. Effect of fertilizers and moisture conservation practices in mustard (*Brassica juncea* L.) under rainfed condition. Crop Research 2011;42(1-3):117-119.