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Growth, yield and economics of maize as affected by cropping sequences, rates and frequency of farm yard manure (FYM)

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A field experiment was conducted at Agronomy farm of Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar during 2008-2009 and 2009-10 on silty clay loam soil with neutral PH. The experiment comprising of three factors viz., cropping sequences S_1, S_2, S_3 and S_4, three farm yard manure (FYM) rates R_1, R_2 and R_3 and three frequencies F_1, F2 and F3 was laid out in a split plot design (cropping sequences in main plot and FYM rates and frequencies in sub plot) replicated thrice. The results showed that during 2009-10, the cropping sequences S_1 and S_4 recorded significantly higher growth characters, yield attributes and yield of maize than S_2 and S_3. the FYM rates increased the growth characters up to 30t ha^{-1} and yield attributes up to 20t ha^{-1}. the grain yield of maize showed significant improvement with FYM application up to 20t ha^{-1} while stover yield increased significantly up to 30 t ha^{-1} FYM frequencies F_1 and F_2 recorded significantly higher growth characters, yield attributes and grain and stover yield of maize over F_3. Highest net returns and benefit cost ratio were realized from the treatment combination $S_2R_1F_1$

Key words: Maize, cropping sequence, farm yard manure (FYM), frequency.

INTRODUCTION

Maize is one of the most important cereal crops grown all over the globe and has relatively higher production potential, wider adaptability and multifarious uses. It is a rich source of carbohydrates and has also higher percentage of proteins than other cereals. Maize yields are stagnant in recent years and this situation cannot coup to solve the food problems of ever increasing population. It is necessary to continuously increase the production to meet the demands of people which can be achieved by supplying plant nutrients in adequate amount and in developing countries these nutrients can be supplied through organic manures and by inclusion ofa legume in the cropping system. In J & k state maize is followed by rabi crops such as oats, brown sarson, pulses, berseem etc.; Lentil in the maize based cropping system can maintain soil fertility and sustain crop productivity, but keeping in view the need for providing nutritious fodder for increased livestock population and also the need for edible oil for domestic consumption, maize- oats, maize- brown sarson cropping system have gained much popularity amongst the farming community. Such a scenario demands addition of plant nutrients to soil in excess than their removal by the cropping system, maintaining the soil health. The alternative can be met through the use of organic; there is also a need for identifying the time of farm yard manure (FYM) application. Hence the present study entitled “Growth, Yield and Economics under maize (*Zea mays* L) based

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cropping system as influenced by rate and frequency of FYM'' was undertaken.

MATERIALS AND METHODS

The experiment was carried out at Agronomy farm of Sher-e-Kashmir, University of Agricultural Science and Technology of Kashmir, Shalimar, Srinagar during Kahrif and rabi seasons of 2008-2009 and 2009-2010 on silty clay loam soil. The available nutrients N, P and K in soil were 272.61, 14.83 and 59.00 kg/ha, respectively with pH 6.74. The experiment was laid out in spilt plot design with three replications, comprising of 3 factors Viz., four cropping sequences (S_1 = maize-lentil, S_2 = maize-oats, S_3 = maize-brown sarson and S_4 = maize-fallow), three FYM rates (R_1 = 10 t ha^{-1}, R_2 = 20 t ha^{-1} and R_3 = 30 t ha^{-1}) and three frequencies (F_1 = FYM application in Kharif and rabi, F_2 = FYM application in Kharif and F_3 = FYM application in rabi). Maize was sown on 15th of May and 23rd of May during 2008-2009 and 2009-2010, respectively while lentil, oats, brown sarson were sown on 27th of April during both the seasons, Well decomposed FYM was applied as per the treatments for maize and half dose of nitrogen (45 Kg N ha^{-1}) and full doses of phosphorus (60 kg P ha^{-1}), potassium (40 kg K_2O ha^{-1}) and Zinc (20 kg Zn ha^{-1}) was applied uniformly to each plot through urea, diammonium phosphate, muriate of potash and Zinc sulphate, respectively,

In case of lentil whole recommended dose of nitrogen (40 kg ha^{-1}), phosphorus (60 kg ha^{-1}) and potassium (20 kg ha^{-1}) was band placed just before sowing. In fodder Oats half dose of nitrogen (75Kg ha^{-1}) and full dose of phosphorus (60 kg ha^{-1}) and potassium (20 kg ha^{-1}) was applied as basal and the remaining half dose of nitrogen was top dressed in two equal splits one each at Knee high stage and 20 days before flowering. In case of brown sarson half dose of nitrogen and full dose of phosphorus and potassium was applied as basal and remaining half dose of nitrogen in two equal spilt one each at flowering and pod initiation stage. The rainfall amounted to 612.10 and 779.00 mm during the cropping seasons of 2008-2009 and 2009-2010 respectively.

RESULTS AND DISCUSSION

Effect of cropping sequences (maize crop)

The land available for cultivation is limited due to ever increasing population, the need, therefore is to intensify agricultural production through increasing the cropping intensity. This can be achieved only through double and multiple cropping.

Growth characters

The study revealed that S_1 and S_4 significantly increased the plant height, number of functional leaves and LAI of maize at different growth stages over S_2 and S_3 during 2009-10, however during 2008-2009 the cropping sequences had no effect on the plant height and number of functional leaves (Table 1).

The significant increase in plant height and functional leaves and LAI with S_1 during 2009-10 could be attributed to the more availability of nitrogen to the crop released from atmospheric fixation of nitrogen by the lentil crop that boosted the plant height and increased the number of leaves through cell division and cell elongation. The possible reasons for non significant results during 2008-09 could be attributed to the fact that during rabi 2007, the experimental plot was under the cultivation of Oats and as such no carryover effects in terms of nutrients could be observed. The higher plant height and number of leaves under S_4 cropping system during 2009-10 could be attributed to lesser depletion of the nutrients from the soil during rabi as the plots remained fallow. These results corroborate the findings of Ziaudin and Arif (2005). Leaf area index (Table 1) during 2008-09 showed non significant influence with different cropping sequences, however during 2009-10,S_1 and S_4 recorded significantly higher leaf area index than S_2 and S_3 (Table 1).The non significant influence recorded during 2008-09 could be due to fact that all the cropping sequences experienced similar fertility as the preceding rabi crop of the experimental plot was oats. During 2009-10, the lentil crop may have fixed atmospheric nitrogen and the fallow plots may have better fertility status that exerted beneficial effects on the maize plants to produce better photosynthetic surface resulting in higher leaf area index.

The data (Table 1) shows that S_1 and S_4 recorded significantly higher dry matter than S_2 and S_3 during 2009-10, whereas during 2008-09 the dry matter remained unaffected by different cropping sequences. The higher plant high, more number of functional leaves per plant and higher leaf area index recorded with S_1 and S_4 could be the reason for higher dry matter production of maize. The non- significant influence during 2008-09 could be the reflection of non-significant influence on the plant height, number or leaves per plant and leaf area index of the crop with different cropping sequences.

Yield attributes and yield

The study reveals that all the yield contributing characters Viz, number of cobs/ Plant, rows per cob, grains per row and 100 grain weight were significantly higher with S_1 and S_4 over S_2 and S_3 during 2009-10, whereas during 2008-09 there was no effect of cropping sequences on the yield contributing characters (Table 2). The nutrient rich soil under lentil crop and the fallow during rabi 2008-09 might have provided nutrients to the maize resulting in the improvement of yield contributing characters. However during 2007 the experiment field was under oats crop and all the experimental plots of maize experienced similar soil fertility that resulted in non-significant effects of cropping sequences. Earlier Ziaudin and Arif (2005) have also reported significant increase in yield contributing characters of maize in maize based cropping system.

The cropping sequence S_1 and S_4 recorded significant increase in maize yield over $_2$ and S_3 during 2009-10 where during 2008-09 the cropping sequences were no

Table 1. Plant height, no. of functional leaves per plant, leaf area index and dry matter of maize as affected by cropping sequences, rates and frequencies of FYM.

Treatments	Plant height (cm)		No. of functional leaves plant^{-1} (Nos.)		Leaf area index		Dry matter (qha^{-1})	
	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10
Cropping sequences								
Maize-Lentil (S_1)	173.62	179.41	11.72	12.87	4.32	4.55	129.27	137.03
Maize-Oats (S_2)	173.78	174.44	11.75	11.00	4.28	4.12	128.42	122.50
Maize-*B. Sarson* (S_3)	174.66	175.34	11.76.	11.10	4.27	4.11	129.00	123.08
Maize-Fallow (S_4)	174.71	177.33	11.78	12.55	4.28	4.39	129.08	136.08
SE(m±)	1.020	1.091	0.121	0.098	0.135	0.069	1.821	2.900
CD (P=0.05)	NS	3.78	NS	0.34	NS	0.24	NS	7.11
FYM rates (tha^{-1})								
10 (R_1)	166.73	168.60	9.91	10.27	3.81	3.80	119.77	120.00
20 (R_2)	175.60	178.71	12.50	12.50	4.35	4.35	131.23	131.85
30 (R_3)	181.54	182.56	12.86	12.86	4.72	4.70	135.92	136.33
SE(m±)	1.124	1.297	0.095	0.081	0.102	0.099	1.478	1.494
CD (P=0.05)	3.18	3.67	0.270	0.23	0.29	0.28	4.15	4.22
FYM frequencies								
FYM in Kharief and Rabi (F_1)	176.93	181.34	12.53	12.69	4.50	4.57	135.27	137.08
FYM in Kharief (F_2)	177.18	168.33	12.60	10.32	4.60	3.34	136.70	114.38
FYM in Rabi (F_3)	169.75	180.40	10.12	12.62	3.80	4.02	114.30	136.72
SE(m±)	1.124	1.297	0.095	0.081	0.102	0.099	1.478	1.494
CD (P=0.05)	3.18	3.67	0.27	0.23	0.29	0.28	4.15	4.22

significant (Table 2). Higher yield of maize realized under S_1 and S_4 is the reflection of the effects of S1 and S4 on the cobs/ plants, grain/ row/ cob (Table 2). The non significant influence of cropping sequence on the yield during 2008-09 could be attributed to the facts that the experimental plot was under oats crop during rabi 2007 and all the plots of maize received similar fertility during Kahrif 2008. S1 and S_4 marked yield superiority of 5.37and 6.91% and 4.81 and 6.34% over S2 and S3, respectively during 2009-10. Jamwal (2000) has also reported the higher yield of maize under maize-wheat sequence followed by maize-toria–gobhi sarson cropping sequence. The Stover yield also followed similar trend as that of grain yield.

Maize equivalent yield

The study revealed that the maize equivalent yield during 2008-09 and 2009-10 was significantly higher with S_2 compared to S_1 and S_2 and S_4 the pooled yield also followed similar trend (Table 3). S_2 recorded a yield superiority of 13.51, 10.41 and 68.46 over S1, S3 and S4 cropping sequences these results could be attributed to the significantly higher maize-equivalent yield of oats than other rabi crops. Tripathi (1998) recorded significantly higher maize equivalent yield in maize-Indian mustard -green fodder cropping sequences whereas, Jamwal (2000) reported significantly higher maize equivalent yield in maize-wheat sequence.

Effects of FYM

Studies have shown that organic agriculture is economically viable farmers can achieve more income as a result of premiums and need fewer inputs to maintain returns.

Growth character

The investigation revealed that except knee high stage all the growth characters of maize, viz, plant height, number of leaves/plant and leaf area index (Table 1) showed significant and constant increase FYM rates from 10 t ha^{-1} up to 30 t ha^{-1} . The beneficial effects of FYM could be attributed to the fact that FYM supplied higher amount of both macro and micronutrient particularly nitrogen that helped in rapid cell division and cell elongation. Earilier Sujatha et al. (2008), Freitas and Stamford (2002), Jayaprakash et al. (2003) also reported similar findings.

It is also inferred from the data (Table 1) that F_2 and F_1 being statistically similar increased the plant height and number of functional leaves per plant and LAI over F_3

Table 2. Yield contributing characters of maize as affected by cropping sequences rates and frequencies of FYM.

Treatments	Cobs plant^{-1} (Nos.)		Cob length (cm)		Grain rows/cob (Nos.)		Grains/ row (Nos.)		100-grain weight (g)	
	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10
Cropping sequences										
Maize-lentil (S_1)	1.09	1.17	17.86	18.65	12.36	12.86	23.50	24.77	20.73	20.83
Maize-oats (S_2)	1.11	1.12	17.34	17.22	12.38	12.68	23.45	23.75	20.61	20.62
Maize-*B. sarson* (S_3)	1.11	1.12	17.70	17.18	12.19	12.70	23.42	23.77	20.64	20.64
Maize-fallow (S_4)	1.10	1.15	17.78	18.15	12.35	12.85	23.32	24.66	20.67	20.68
SE(m±)	0.017	0.011	0.193	0.173	0.329	0.42	0.410	0.233	0.268	0.216
CD (P=0.05)	NS	0.04	NS	0.60	NS	NS	NS	0.81	NS	NS
FYM rates (tha^{-1})										
10 (R_1)	1.06	1.09	15.95	16.10	11.46	11.61	22.70	23.65	19.96	20.38
20 (R_2)	1.13	1.15	18.05	18.13	12.48	13.34	23.75	24.48	21.09	21.00
30 (R_3)	1.16	1.16	19.01	19.17	13.01	13.36	23.84	24.55	21.25	21.04
SE(m±)	0.011	0.007	0.099	0.074	0.208	0.265	0.053	0.044	0.166	0.191
CD (P=0.05)	0.03	0.02	0.28	0.21	0.89	0.75	0.15	0.14	0.47	0.54
FYM frequencies										
FYM in Kharief and Rabi (F_1)	1.10	1.17	18.85	18.17	12.77	13.39	23.65	24.43	20.91	20.42
FYM in Kharief (F_2)	1.10	1.16	18.10	16.94	12.70	11.48	23.49	23.65	20.87	20.21
FYM in Rabi (F_3)	1.09	1.18	16.66	18.29	11.49	13.36	23.18	24.59	20.31	20.98
SE(m±)	0.011	0.007	0.099	0.074	0.208	0.265	0.053	0.049	0.166	0.191
CD (P=0.05)	NS	0.02	0.28	0.21	0.89	0.75	0.15	0.14	0.47	0.54

Table 3. Grain and Stover yield (qha^{-1}) and yield equivalent of maize (qha^{-1}) a as affected by cropping sequences rates and frequencies of FYM

Treatments	Grain yield (qha^{-1})		Stover yield (qha^{-1})		Yield equivalent		Pooled
	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10	
Cropping sequences							
Maize-Lentil (S_1)	48.66	52.76	63.21	68.28	93.21	97.85	95.53
Maize-Oats (S_2)	48.50	50.05	62.50	64.89	107.78	109.11	108.44
Maize-brown sarson (S_3)	48.35	49.35	62.56	63.90	96.39	100.03	98.21
Maize-Fallow (S_4)	48.38	52.48	62.60	67.93	62.26	66.48	64.37
SE(m±)	0.733	0.604	0.672	0.857	2.27	2.26	2.26
CD (P=0.05)	NS	2.37	NS	2.97	7.86	7.83	7.84
FYM rates (tha^{-1})							
10 (R_1)	46.81	49.15	59.97	63.07	85.52	88.75	87.12
20 (R_2)	49.31	52.10	62.06	65.24	91.16	94.77	92.96
30 (R_3)	49.31	52.19	66.11	70.02	93.04	96.61	94.82
SE(m±)	0.40	0.47	0.926	0.976	0.75	0.89	0.82
CD (P=0.05)	1.13	1.32	2.62	2.76	2.13	2.52	2.32
FYM frequencies							
FYM in Kharief and Rabi (F_1)	49.17	52.28	64.13	67.58	93.03	95.86	94.45
FYM in Kharief (F_2)	49.39	49.39	63.91	64.08	93.87	90.36	92.11
FYM in Rabi (F_3)	46.86	51.81	60.11	67.07	82.82	93.89	88.35
SE(m±)	0.40	0.47	0.926	0.976	0.75	0.89	0.82
CD (P=0.05)	1.13	1.32	2.62	2.76	2.13	2.52	2.32

during 2008-2009, However during 2009-10, F_3 and F_1 significantly increased the plant height. During 2008-2009, the plant nutrient especially nitrogen released from applied FYM could have resulted in rapid cell division and cell elongation however during 2009-10 the residual FYM applied during rabi could have released sufficient nutrients to produce taller plants and more number of leaves per plant and higher LAI. The results (Table 1) further inferred that FYM frequency F_2 and F_1 significantly increased the dry matter during 2008-09, whereas, during 2009-10 F_3 and F_1 recorded significantly higher dry matter than F_2, these results could be attributed to the fact that FYM supplied the nutrient in a balanced proportion and improved physical characters which might have affected the crop synergistically (Badiyala and Verma, 1990). Further the superiority of F_3 and F_1 over F_2 during 2009-10 could be attributed to the residual effects of FYM.

Yield attributes and yield

The data (Table 2) inferred that number of cobs per plant and cob length showed significant and consistent increase with increase in FYM rate up to 30 t ha-^{1} whereas, grain rows cob^{-1} ,grains row^{-1} and 100 grain weight recorded significant increase up to 20 t ha^{-1} during both years of 2008-2009 and 2009 -2010. FYM releases all macro and micro nutrients essential for plant growth as well as encourages microbial population and improves physical condition of soil there by effects yield contributing characters. The results are in accordance with the findings of Kumar and Puri (2001) and Verma et al. (2003). F_1 and F_2 recorded significant increase in the entire yield contributing characters over F_3 during 2008-09, whereas F_3 and F_1 recoded higher yield contributing characters during 2009-10 (Table 2). The availability of macro and micronutrients to kharif maize through FYM may have contributed to beneficial effects on the yield contributing characters during 2008-09, whereas during 2009-10, significantly higher yield contributing characters recorded with F_3 and F_1 than F_2 could be attributed to the residual effects of FYM applied to the rabi crops.

Data (Table 2) inferred that there was a significant increase in the grain yield of maize with increase in FYM rate upto 20 t ha^{-1} during both the years.30t FYM did not cause any significant increase over 20 t FYM ha^{-1}.The superiority of grain yield recorded with 20 t FYM ha^{-1} was to the tune of 12.27 and 10.68% over 10 t FYM ha^{-1} during 2008-09 and 2009-10, respectively. Higher grain yield obtained at higher FYM rate was mainly due to positive effect of FYM on yield contributing characters. Earilier Khanday and Thakur (1991), Khanday et al. (1993) and Jayaprakash et al. (2003) have also reported significant increase in grain yield of maize with increase in FYM rate upto 20 t ha^{-1}. It can also be inferred from the Table that during 2008-09, F1 and F2 recorded significantly higher grain yield of maize over F3, whereas during 2009-10, F3 and F1 recorded significantly higher grain yield over F2. Infact the applied FYM released the nutrients in adequate amount in the fallowing season and very less quantity in the season in which it is applied. Due to lower temperatures in winter the mineralization of FYM is very less but in the following kharif season the mineralization is very fast due to higher temperatures and as such during 2009-10 F_3 and F_1 recorded significantly higher grain yield than F_2.

The stover yield showed a significant improvement with increase in FYM application up to 30 t ha^{-1} (Table 2). This could be attributed to the significant improvement in the plant height and dry matter accumulation of maize. Previously, Singh et al. (1995, 1999), Brar et al. (2001) and Jayaprakash et al. (2003) also reported significant increase in stover with application of FYM up to 30t ha^{-1}. Further significant increase in the stover yield recorded with F1 and F2 over F3 (Table 3) during 2008-09 and F3 and F1 over F2 during 2009-10 could be the reflection of the effect of these treatments on the plant height and dry matter production of the crop.

Economics

The efficiency of a treatment is finally decided in terms of the economics (benefit : cost ratio) of that treatment. The present investigation revealed (Table 4) that during two years of cropping system benefit: cost ratio remained highest (1.76) with treatment combination S_2 R_1 F_1 which was closely followed by S_2 R_1 F_1 (1.74). The gross returns were highest with S2 R2 F3, whereas net returns were highest with S_2 R_1 F_1 indicating there by that both net returns and benefit cost ratio in maize based cropping system was realized with maize-oats supplied with 10 tFYM ha^{-1} during kharif and rabi season.

Conclusion

The maize-lentil cropping sequence recorded significantly higher grain yields of maize, where as maize-oats cropping sequence gave significantly highest yield of oats. Application of 20 t FYM ha^{-1} in kharif and rabi or rabi alone recorded significantly higher grain yield of maize. However, maize-oats cropping sequences supplied with 10 t FYM ha^{-1} in kharif and rabi recorded significantly higher maize equivalent yield than other cropping sequences and rates and frequencies of FYM, it also realized higher net returns and benefit cost ratio. Thus the results of two years study lead to the conclusion that for realizing higher grain yield of maize based cropping system under Kashmir valley conditions rates and frequency of FYM for maize- oats cropping system must centre around 10 t FYM ha^{-1} to be applied in kharif and rabi along with recommended package of NPK for both maize and oats.

Table 4. Relative economics (hectare basis) of maize based cropping system as affected by cropping sequences, rates and frequencies of FYM (Pooled equivalent yield).

Treatment combination	Gross returns (Rs./ha)	Cost of cultivation (Rs./ha)	Net returns (Rs./ha)	Benefit: cost ratio
$S_1R_1F_1$	85500.00	33889.20	51610.80	1.52
$S_1R_1F_2$	84798.00	33889.20	60809.80	1.50
$S_1R_1F_3$	83673.00	33889.20	49783.80	1.47
$S_1R_2F_1$	87255.00	33889.20	48365.80	1.24
$S_1R_2F_2$	86553.00	33889.20	47663.80	1.22
$S_1R_2F_3$	85428.00	33889.20	46538.80	1.20
$S_1R_3F_1$	87516.00	43889.20	43626.80	0.99
$S_1R_3F_2$	87111.00	43889.20	43221.80	0.98
$S_1R_3F_3$	85986.00	43889.20	42096.80	0.96
$S_2R_1F_1$	97092.00	35209.40	61882.60	1.76
$S_2R_1F_2$	96390.00	35209.40	61180.60	1.74
$S_2R_1F_3$	95256.00	35209.40	60046.60	1.70
$S_2R_2F_1$	98838.00	40209.40	58628.60	1.46
$S_2R_2F_2$	98136.00	40209.40	57926.60	1.44
$S_2R_2F_3$	97011.00	40209.40	56801.60	1.41
$S_2R_3F_1$	99396.00	45209.40	54186.60	1.20
$S_2R_3F_2$	98694.00	45209.40	53484.60	1.18
$S_2R_3F_3$	97569.00	45209.40	52359.60	1.16
$S_3R_1F_1$	87885.00	32849.60	55035.40	1.67
$S_3R_1F_2$	87183.00	32849.60	54333.40	1.65
$S_3R_1F_3$	86049.00	32849.60	53199.40	1.62
$S_3R_2F_1$	89631.00	37849.60	51781.40	1.37
$S_3R_2F_2$	88929.00	37849.60	51079.40	1.35
$S_3R_2F_3$	87804.00	37849.60	49954.40	1.32
$S_3R_3F_1$	90189.00	42849.60	47339.40	1.10
$S_3R_3F_2$	89487.00	42849.60	46637.40	1.09
$S_3R_3F_3$	88362.00	42849.60	45512.40	1.06
$S_4R_1F_1$	57429.00	24843.10	32585.90	1.31
$S_4R_1F_2$	56727.00	24843.10	31883.90	1.28
$S_4R_1F_3$	55593.00	24843.10	30749.90	1.24
$S_4R_2F_1$	59175.00	29843.10	29331.90	0.98
$S_4R_2F_2$	58473.00	29843.10	28629.90	0.96
$S_4R_2F_3$	57348.00	29843.10	27504.90	0.92
$S_4R_3F_1$	59733.00	34843.10	24889.90	0.71
$S_4R_3F_2$	59031.00	34843.10	24187.90	0.69
$S_4R_3F_3$	57906.00	34843.10	23062.90	0.66

Input cost			**Output cost**		
Parameter	**2008-09**	**2009-10**	**Parameter**	**2008-09**	**2009-10**
Maize seed	Rs. 20/kg	Rs. 20/kg	Maize grain	Rs. 9/kg	Rs. 9/kg
Lentil seed	Rs. 40/kg	Rs. 40/kg	Maize stover	Rs. 200/q	Rs. 200/q
Oats seed	Rs.12/kg	Rs. 12/kg	Lentil	Rs. 35/kg	Rs. 35/kg
Brown sarson seed	Rs. 30/kg	Rs. 30/kg	Brown sarson	Rs. 25/kg	Rs. 25/kg
FYM	Rs. 0.50/kg	Rs. 0.50/ kg	Straw	Rs. 1/kg	Rs. 1/kg
Nitrogen	Rs. 12.32/kg	Rs. 12.32/kg	Green oats	Rs. 100/q	Rs. 100/q
Phosphorus	Rs. 25.30/kg	Rs. 25.30/kg	Lentil straw	Rs. 0.50/kg	Rs. 0.50/kg
Potash	Rs. 9.79 /kg	Rs. 9.79 /kg			
$ZnSo_4$	Rs. 110/kg	Rs. 110/kg			
Labour	Rs. 70/day	Rs. 110/day			
Tractorization	Rs. 3000/ha	Rs. 3000/ha			

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