increase in N and P level was attributed to the facts that better availability of N resulted in increase of LA, LAI and plant height. It was obvious that the higher water up take and rapid growth, delayed maturity and less sucrose contents were resulting in lower sugar recovery percentage. The increase in recovery percentage with increase in inter strip spacing were due to improved light interception and better air circulation by way of enhanced photosynthetic activity. These results are in line with Singh and Singh (1984) and Kathirisan and Narayanasmy (1991).

Table 4: Bio economic response of autumn sugarcane to NPK doses, planting geometry and soil texture

Treatments	Shoot dry weight (g m^{-2})		Sugar yield(t ha^{-1})		Sugar recovery (%)		Fertilizer use Efficiency(kgkg^{-1})	
	Sandy loam	Silty clay	Sandy loam	Silty clay	Sandy loam	Silty clay	Sandy loam	Silty clay
F0 × G1	638.0r	655.6s	3.66i	4.03f	8.60l	9.15g	0.00m	0.00n
F0 × G2	657.8q	682.0r	4.14i	4.56f	9.25hi	9.70d	0.00m	0.00n
F0 × G3	686.4p	699.6q	4.94hi	4.90f	10.30cd	10.00c	0.00m	0.00n
F0 × G4	624.8s	629.2t	4.63hi	4.52f	11 .30a	10.90a	0.00m	0.00n
F1 × G1	1095.6n	1148.4o	6.41gh	7.24e	8.60l	9.1 7g	175.00j	160.82k
F1 × G2	1167.3m	1201 .2n	7.62fg	8.14de	9.22i	9.63de	187.50i	205.31g
F1 × G3	1203.4l	1236.4m	8.87efg	8.76de	10.23de	9.98c	187.50i	194.57i
F1 × G4	1012.0o	1 060.4p	7.25g	7.58e	11.1 6b	10.90a	140.00l	120.07m
F2 × G1	1276.0k	1342.0k	7.93fg	8.62cde	8.35m	8.84h	178.33j	175.85j
F2 × G2	1328.8j	1403.6j	9.17ef	9.82cd	9.08j	9.53e	186.67i	198.35h
F2 × G3	1381 .6i	1456.4i	10.26de	8.81c	9.59g	9.95c	196.67h	197.52hi
F2 × G4	1210.0l	1262.8l	9.10ef	9.31cd	10.40c	10.52b	156.67k	155.02l
F3 × G1	1683.0f	1729.2f	11 .45cd	12.46b	8.11 m	8.70i	225.00e	247.69d
F3 × G2	1771.0d	1817.2d	13.19ab	14.27ab	8.72l	9.31f	265.63b	274.57b
F3 × G3	1881 .0b	1940.4b	15.34a	15.75a	9.37h	9.56e	289.38a	290.19a
F3 × G4	1553.2h	1614.8h	12.84bc	12.83b	10.15e	10.06c	215.00g	213.94f
F4 × G1	1702.8e	1746.8e	11 .01cd	12.57b	7.67n	8.64i	21 5.56f	225.30e
F4 × G2	1790.8c	1843.6c	12.43ab	13.94ab	8.10m	8.91h	243.34d	249.19d
F4 × G3	1900.8a	1949.2a	14.81 a	15.52a	8.95k	9.35f	260.00c	261 .96c
F4 × G4	1577.4g	1632.4g	12.84b	12.1 1b	9.97f	9.35f	195.56h	195.30hi
$LSD_{0.05}$	**19.8**	**8.8**	**1.97**	**2.92**	**0.14**	**0.38**	**23.75**	**15.62**
Means followed the same letter in a column do not differ significantly at 5 % level of probability								

3.5 Water Use Efficiency

Water use efficiency was maximum 61.3 and 97.6 kg mm^{-1} in F4×G3 (Table 5). However, it was statistically at par with F3×G3 and was minimum 15.2 and 24.4kg mm-1in sandy loam and silty clay soils, respectively in F0×G4. It was observed that water use efficiency was 303.3 and 300 % higher in F4×G3 in comparison with F0×G4 in sandy loam and silty clay soils, respectively. Similarly WUE was 71 to 1% higher in F4×G3 than that of F0×G3, F1×G3, F2×G3, and F3×G3 on both soils. It was 74 to 12 % higher in F4×G3 than F4×G2, F4×G1, and F4×G4 in ediphico conditions. This appreciation in water use efficiency was due to complementary effect of better nutrient availability, efficient light interception and air circulation (Table 5). It was also observed that silty clay soil displayed 37.2 % higher water use efficiency against sandy loam soil due to better water holding capacity. Thus water saving of 344 mm was obtained in silty clay soil against the requirement of 2500 mm (Anonymous. 2014).

Fertilizer use efficiency (kg kg^{-1})

Fertilizer use efficiency was maximum 289.38 and 290.19 kg kg^{-1} in F3×G3 followed by F3×G2 (265.63 and 274.57 kg kg^{-1}), F4×G3 (260 and 262 kg kg^{-1}) and F4×G2 (243.34 and 249.19 kg kg^{-1}) in comparison with control in sandy loam and silty clay soils, respectively (Table 4). It was also observed that FUE was decreased with parallel increase in fertilizer dose from 200:200:100 to 250:200:100 NPK kg ha^{-1}. FUE was also decreased with subsequent decrease of fertilizer dose from 150:150:100 and 100:100:100 NPK kg ha^{-1}. This increase in fertilizer use efficiency was attributed to a substantial increase in stripped can yield shown in Table 5.

3.4 Benefit Cost Ratio

Benefit cost ratio (BCR) calculations revealed that effect of NPK doses and planting patterns on BCR was significantly different (Table 5). The maximum BCR was 1.64 and 1.59 in F3×G3 and minimum 0.01 and 0.02 in F0×G4 in sandy loam and silty clay soils respectively. Increase in BCR in F3×G3 was due to improved water and fertilizer use efficiency (Table 5). Increase in nitrogen level beyond 200 kg ha^{-1} had left no significant effect on BCR. It was noted that 30/120cm paired row strip planting proved better sowing method for inter cropping to harvest maximum sugar yield.

Table 5: Stripped cane yield, water and fertilizer use efficiency as affected by NPK doses, planting geometry and soil texture

Treatments	Leaf area duration (LAD)		Stripped cane yield(t ha^{-1})		Water use efficiency (kgmm^{-1})		Benefit cost ratio	
	Sandy loam	Silty clay	Sandy loam	Silty clay	Sandy loam	Silty clay	Sandy Loam	Silty clay
F0 × G1	466.68m	472.69m	42.50r	44.00n	15.7r	25.9n	0.05q	0.10p
F0 × G2	481.13l	482.53l	44.75q	47.00m	16.6q	27.6m	0.1 0p	0.1 6o

F0 × G3	493.34k	489.1 4l	48.00p	49.00m	17.8p	28.8m	0.18o	0.21n
F0 × G4	469.07m	462.95n	41.00s	41 .50n	15.2s	24.4n	0.01 r	0.02q
F1 × G1	779.27i	796.44j	74.50n	79.00k	27.6n	46.5k	0.39m	0.45l
F1 × G2	809.65h	821 .48i	82.65m	84.50j	30.6m	49.7j	0.54k	0.55j
F1 × G3	825.68g	838.78h	86.75l	87.75i	32.1l	51.6i	0.61j	0.61i
F1 × G4	769.67j	781.82k	65.00o	69.50l	24.1o	40.9l	0.21 n	0.27m
F2 × G1	818.26g	837.62h	95.00k	97.50h	35.2k	57.4h	0.64i	0.65h
F2 × G2	846.87f	866.84ef	101.00j	103.00g	37.4j	60.6g	0.75h	0.74g
F2 × G3	875.97c	889.38c	107.00i	88.50i	39.6i	52.1i	0.85g	0.83f
F2 × G4	807.20h	831 .84h	87.50l	88.50i	32.4l	52.1i	0.51l	0.50k
F3 × G1	856.94e	875.11de	141.2f	143.25d	52.3f	84.3d	1 .28e	0.50k
F3 × G2	902.97b	91 8.26b	151.25d	153.25c	56.0d	90.1c	1 .45c	1 .41c
F3 × G3	947.56a	963.69a	163.75b	164.75a	60.6b	96.9a	1.64a	1.59a
F3 × G4	848.12f	862.13f	126.50h	127.50e	46.9h	75.0e	1.05f	1.01 e
F4 × G1	867.06d	876.29d	143.5e	145.50d	53.1e	85.6d	1 .27e	1 .24d
F4 × G2	91 0.76b	91 8.26b	153.50c	156.50b	56.9c	92.1b	1 .43d	1 .41c
F4 × G3	946.23a	970.93a	165.50a	166.00a	61.3a	97.6a	1 .62b	1 .56b
F4 × G4	851 .90ef	853.92g	128.75g	129.50e	15.7g	25.9e	1 .04f	0.99e
LSD 0.05	**455.34**	**602.79**	**52.67**	**9.5**	**45.6**	**70.7**	**0.02**	**0.03**

Means followed the same letter in a column do not differ significantly at 5 % level of probability

4. Conclusion and Recommendations

It was concluded that maximum sugar yield, fertilizer use efficiency, optimum shoot dry weight and benefit cost ratio could be obtained from nutrient dose of 200–200-100NPK kg ha^{-1}along with 30/90cm spaced paired row strip planting pattern in sandy loam and silty clay soils of arid agro climate. Sugar recovery percentage decreased by increasing the level of nitrogen and phosphorus without increasing potassium and it was improved by increasing row spacing up to 30/120cm. Therefore, nutrient dose of 200-200-100NPK kg ha^{-1}alongwith 30/90 cm paired row strip planting was recommended for maximum sugar yield.

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