

ASSESSMENT OF FODDER MAIZE AND STYLO (1:1) INTERCROPPING IN MID-CENTRAL TABLE LAND ZONE OF ODISHA

¹T.K. Samant*, ²D. Panigrahi and ¹B. Satpathy

¹Krishi Vigyan Kendra, (OUAT), Angul-759132

²RRTTSS(OUAT), Mahisapat, Dhenkanal- 759001

E-mail: tksamant_2003@yahoo.co.in (*Corresponding author)

Abstract: A field trial was conducted during *kharif* season of 2015 and 2016 in farmer's field at *Sandhapal* village of Angul district in Odisha to assess fodder maize and stylo(1:1) intercropping comprising three treatments *viz.* sole maize, sole stylo and maize+ stylo(1:1) intercropping laid out in randomized block design with ten replications. Maize + stylo(1:1) intercropping produced 27.4% higher green forage (215.68 q ha⁻¹) than farmers practice of sole maize. The maximum DMY of 66.15 q ha⁻¹ was obtained in maize + stylo(1:1) intercropping which was 19.4% and 13.4% higher than sole cropping of maize and stylo respectively. Stylo sole had maximum increase in available nitrogen, phosphorus and potash content, 23.8, 6.47 and 1.44 % respectively than the initial soil status. The same treatment also recorded maximum gross return (Rs. 50335.98 ha⁻¹), net return (Rs. 29978.03 ha⁻¹) and profitability (Rs.78.31 ha⁻¹day⁻¹). Thus, maize and stylo (1:1) intercropping fits well to the existing farming situation for its higher green forage yield, profitability and better soil fertility.

Keywords: Fodder maize, GFY, profitability, production efficiency, post harvest soil status, stylo.

Introduction

Maize (*Zea mays* L.) is an important fodder cereal grown during *kharif* season. It is grown either as an pure crop or intercropped with seasonal fodder or perennial fodder for enriching their nutritive value. In forages intercropping is the need of the present day for higher production, productivity and better nutritional qualities than the traditional system of feeding cereal or legume in isolation to the animals. The productivity of any intercropping systems greatly depends upon not only the component crops but also to row proportions^[1]. Stylo is herbaceous, nutritive, used as feed for all types of animals, substitute of costly nitrogenous fertilisers has the potentiality in improving in soil fertility and degraded land. At present, the country faces a net deficit of 61.1% green fodder, 21.9% dry crop residues and 64% feeds. The regional deficits are more important than the national deficit, especially for fodder, which is not economical to transport over long distances. The intensive cropping systems when managed properly using modern techniques of soil and crop management are able to

yield 180 - 300 tonnes of green fodder (30 - 55 tonnes dry fodder) per ha year⁻¹ [2]. Hence the present investigation was carried out to study the effect of maize-stylo intercropping on fodder yield, economics and post harvest soil status.

Materials and Methods

A field trial was conducted during *kharif* season of 2015 and 2016 in farmer's field at *Sandhapal* village (20° 50' 37.2" N, 84° 57' 9.3" E) of Angul district in Odisha to assess fodder maize and stylo comprising three treatments *viz.* sole maize, sole stylo and maize+ stylo(1:1) intercropping. The average rainfall in both the year during the study period from June to December was 678.4 mm. The mean maximum and mean minimum temperature registered in both the year was 32.0° C and 16.0° C respectively. The soil of the experimental site was slightly acidic in reaction (pH-5.6), sandy loam in texture with medium in organic carbon (0.45 %), available nitrogen (176.6 kg ha⁻¹), potash (174.3 kg ha⁻¹) and low in phosphorus (10.2 kg ha⁻¹) content [3]. The treatments comprised of different fodder cultivation practice *viz.* T₁- Farmers practice (sole maize), T₂- sole stylo, T₃- Maize+ stylo(1:1) intercropping were arranged in randomised block design with ten replications. Recommended package of practices were followed for raising fodder maize (J 1006) and stylo (*Stylosanthes scabra*). Both the crops were sown during 1st week of July and were applied with recommended dose of fertilizer for maize and stylo 80:40:40 and 20:50:30 kg N:P:K ha⁻¹ respectively. The seeds were dibbled at a spacing of 30 cm between rows with a seed rate 50 kg ha⁻¹ for maize and 5 kg ha⁻¹ for stylo. First cutting of maize was taken at 70 DAP and first harvest in stylo was taken 3-4 months after sowing and subsequent harvest (4 nos) at 45 days intervals.

Final green fodder yields, fodder dry matter were recorded and productivity, profitability were calculated. Variations in organic carbon, available nitrogen, phosphorus and potassium were measured using standard soil analysis methods [3]. The data were statistically analyzed applying the techniques of analysis of variance and the significance of different sources of variations were tested by error mean square of Fisher Snedecor's 'F' test at probability level 0.05 [5].

Results and Discussion

Green forage yield (GFY), dry Matter yield (DMY), production efficiency

In maize-stylo(1:1) intercropping the combined GFY was higher as compared to sole crop. Maize + stylo(1:1) intercropping produced 27.4% higher green forage (215.68 q ha⁻¹) than farmers practice of sole maize (Table 1). The sole crop of maize and stylo produced forage yield 169.28 q ha⁻¹ and 232.09 q ha⁻¹ respectively. This might be due to increase in

protoplasmic constituents, cell enlargement and efficient utilisation of nutrients^[6]. The maximum DMY of 66.15 q ha⁻¹ was obtained (Table 1) in maize + stylo(1:1) intercropping which was 19.4% and 13.4% higher than sole cropping of maize and stylo respectively may be due to more no of stylo rows contributing higher dry matter in the intercropping system^[7]. The maximum production efficiency (83.89 kg ha⁻¹ day⁻¹) was recorded in maize + stylo(1:1) intercropping followed by stylo sole. The lowest production efficiency (56.43 kg ha⁻¹ day⁻¹) was found in sole maize cropping due to lower green fodder yield.

Table 1: Effect of treatment on GFY, DMY, production efficiency and post harvest soil status

Treatment	GFY (q ha ⁻¹)	DMY (q ha ⁻¹)	Production efficiency (kg ha ⁻¹ day ⁻¹)	Organic Carbon content (%)	Available nutrient status (kg ha ⁻¹)		
					N	P	K
Maize sole	169.28	55.40	56.43	0.42	170.83	10.16	172.44
Stylo sole	232.09	58.35	77.36	0.55	218.56	10.86	176.81
Maize + Stylo (1:1)	215.68	66.15	83.89	0.51	203.13	10.47	175.30
SEm +	1.16	0.24	0.39	0.002	0.84	0.04	0.58
CD(0.05)	3.44	0.70	0.56	0.007	2.49	0.11	1.72
Initial soil status				0.45	176.6	10.2	174.3

Post harvest soil fertility status

The post harvest soil status shows that stylo sole (Table 1) reported the maximum increase in available nitrogen, phosphorus and potash content, 23.8, 6.47 and 1.44 % respectively than the initial soil status might be due to inclusion of legume fodder crop in intercropping systems increased the available nitrogen of soil due to addition of nutrient by biologically N-fixation Maximum organic carbon build up(0.1%) was also obtained in the sole stylo^[4]. stylo which is attributed to accumulation of root residues and shedding of leaves by the legumes^[6]. Sole maize cropping has reduced soil fertility to 5.77 kg ha⁻¹ N, 0.04 kg ha⁻¹ P₂O₅ and 1.86 kg ha⁻¹ K might be due to higher uptake and lower addition of nutrient in soil.

Economics

The maximum gross return (Rs. 50335.98 ha⁻¹), net return (Rs. 29978.03 ha⁻¹) and profitability (Rs.78.31 ha⁻¹day⁻¹) was obtained from maize + stylo (1:1) intercropping owing to its higher green fodder yield(Table 2). Maximum benefit cost ratio (2.71) ratio was recorded in stylo sole owing to its less cost of cultivation.

Table 2: Effect of treatment on cost of cultivation, gross return, net return, profitability and B:C ratio

Treatment	Cost of cultivation (Rs ha ⁻¹)	Gross return (Rs ha ⁻¹)	Net return (Rs ha ⁻¹)	Profitability (Rs.ha ⁻¹ day ⁻¹)	B:C ratio
Maize sole	22823.80	33855.27	11031.48	28.85	1.49
Stylo sole	17314.45	46418.66	29104.21	76.05	2.71
Maize + Stylo (1:1)	20357.95	50335.98	29978.03	78.31	2.48
SEm +	39.89	231.46	230.62	1.65	0.012
CD (0.05)	118.50	687.64	685.14	4.90	0.56

Conclusion

Thus, maize and stylo (1:1) intercropping fits well to the existing farming situation for its higher green forage yield, profitability and better soil fertility.

Acknowledgement

The authors are thankful to Zonal Project Director, Zone-VII (ICAR) for providing support towards conducting the on farm trial.

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