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Evaluation of direct seeded dibbled rice-sweet corn-green gram cropping system grown on polythene mulch

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Abstract

A field experiment was conducted at Agricultural Research Station, Phondaghat, Tal. Kankavali, Dist. Sindhudurg of Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri, Maharashtra during the year 2018-19, 2019-20 and 2020-21 to evaluate the direct seeded dibbled rice-sweet corn-green gram cropping system grown on polythene mulch. The experiment was laid out in a randomized block design taking six treatments with four replications. The results of study indicated that significantly taller plant and higher straw yield of rice was recorded in treatment of flat bed with silver-black polythene mulch, whereas raised bed with silver-black polythene mulch registered more number of productive tillers, longest panicle and higher grain yield. In case of sweet corn significantly taller plant, more number of leaves plant⁻¹, maximum green cob and green fodder yield corn was recorded in treatment of flat bed with silver-black polythene mulch, while raised bed with silver-black polythene mulch registered significantly more number of cobs plant⁻¹ and weight cob⁻¹. In green gram significantly higher plant height and number of pods plant⁻¹ was observed in treatment of raised bed with silver-black polythene mulch. In case of seed and stover yield of green gram, treatment flat bed with silver-black polythene mulch found to be statistically superior. Raised bed with silver-black polythene mulch recorded higher system rice grain equivalent yield, gross returns, net returns and benefit cost ratio followed by flat bed with silver-black polythene mulch.

Keywords: Mulching, growth attributes, yield attributes, yield, economics

Introduction

In Konkan region of Maharashtra, rice is mainly grown by transplanting method which is laborious, time consuming and costlier. It requires more initial expenditure for nursery raising, more number of labours for the operation like uprooting of seedlings, transport of seedlings, puddling and transplanting. Due to establishment of different industries in Konkan region, scarcity of labour is posing a severe problem to agriculture. Therefore the researchers and farmers are looking to adopt alternative methods of rice establishment like direct seeding by drilling or dibbling, *rahu* method, etc. Direct seeding is quicker, easier and economical. Direct seeded rice helps to maintain the physical properties of soil which proved advantageous in attaining desired tilth and timely sowing of the succeeding crop (Sharma *et al.* 2007)^[4]. Studies have revealed that direct-seeded rice (DSR) has the potential to replace the traditional transplanted rice

Growing of crops on mulches offer many advantages. In recent years, use of plastic mulching in agriculture is found to be beneficial. Plastic mulches are completely impermeable to water; therefore it prevents direct evaporation of moisture from the soil and thus limits the water losses and soil erosion. Plastic mulches can offer a barrier against weeds, moisture loss, nutrient loss, erosion, insect and disease injury. It increases the soil temperature and develop soil micro climate favorable for growth, development and early maturity of the crop. There is early germination under polythene mulch and initial crop growth is also better. Better germination and early corn initiation and flowering were also observed under polythene mulch (Mahale *et al.* 2002)^[3]. Therefore use of plastic mulching in direct seeded dibbled rice- sweet corn- green gram cropping system will help to increase the yield. Keeping this point in the view, the present study was conducted to evaluate the direct seeded dibbled rice-sweet corn-green gram cropping system grown on polythene mulch.

Materials and Methods

A field experiment was conducted at Agricultural Research Station, Phondaghat, Tal. Kankavali, Dist. Sindhudurg of Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri, Maharashtra during the year 2018-19, 2019-20 and 2020-21 to evaluate the direct seeded dibbled rice-sweet corn-green gram cropping system grown on polythene mulch. The experiment was laid out in a randomized block design taking six treatments viz., flat bed with no mulch, raised bed with no mulch, flat bed with silver-black polythene mulch, raised bed with silver-black polythene mulch, flat bed with black polythene mulch and raised bed with black polythene mulch with four replications. The 30 micron polythene mulching paper was used and on the same polythene much six crops were taken. Normal crop husbandry practices were followed for satisfactory crop growth.

Results and Discussion

Effect on growth attributes, yield attributes and yield of rice

It is clear from data presented Table 1 that, growth attributes, yield attributes and yield of rice was significantly influenced due to different treatments. Both silver-black and black polythene mulch either on flat bed or raised bed showed its superiority over no mulch treatments. Significantly taller plant and higher straw yield was recorded in treatment of flat bed with silver-

black polythene mulch over rest of the treatments, however it remained statistically at par with flat bed with black polythene mulch for plant height and raised bed with silver-black polythene mulch for straw yield, whereas raised bed with silver-black polythene mulch (T_4) registered more number of productive tillers, longest panicle and higher grain yield than rest of the treatments under study except, raised bed with black polythene mulch for length of panicle and grain yield, which behaved statistically in similar way with treatment T_4 . These results are also comparable with findings of Ehsanullah *et al.* (2014) ^[1] in aerobic rice.

This increase in values of growth and yield attributes on plastic mulch might be due to effective weed control, which had reduced the competition of weeds with rice crop for space, water, light and nutrients. Thus more space, water, light and nutrients were available for the better growth and development of crop which resulted into higher values of growth and yield attributes. Similarly, increase in minimum soil temperature and soil moisture content in the upper portion of the soil, provided an ideal environment for vigorous growth of the plant. The higher grain and straw yield of rice obtained on plastic mulch may be due to significant increase in growth and yield attributes in polythene mulch. The beneficial effect of plastic mulch on growth and yield attributes of rice finally enhanced the yield of rice.

Table 1: Growth attributes, yield attributes and yield of rice as influenced by different treatments (mean of 3 years).

Treatments	Plant height (cm)	No. of productive tillers hill ⁻¹	Length of panicle (cm)	Grain yield (q ha ⁻¹)	Straw yield (q ha ⁻¹)
T ₁ Flat bed with no mulch	103.98	8.75	21.44	43.23	63.31
T ₂ Raised bed with no mulch	102.98	9.25	22.33	44.99	61.85
T ₃ Flat bed with silver-black polythene mulch	112.69	11.53	23.22	52.22	75.06
T ₄ Raised bed with silver-black polythene mulch	108.64	12.97	24.10	56.03	72.36
T ₅ Flat bed with black polythene mulch	111.70	10.77	22.72	51.30	70.41
T ₆ Raised bed with black polythene mulch	107.42	11.65	23.51	53.74	69.13
SEM ±	1.00	0.40	0.21	1.07	1.22
C. D. at 5 %	2.84	1.13	0.59	3.03	3.46
General Mean	107.90	10.82	22.89	50.25	68.69

Effect on growth attributes, yield attributes and yield of sweet corn

An examination of data presented in table 2 reveals that, plant height, number of leaves plant⁻¹, number of cobs plant⁻¹, weight cob⁻¹, green cob and green fodder yield of sweet corn was significantly influenced due to different treatments. Significantly taller plant and more number of leaves was recorded in treatment of flat bed with silver-black polythene mulch (T_3) over rest of the treatments under study, except treatment raised bed with silver-black polythene mulch for number of leaves plant⁻¹, which behaved statistically in similar way with treatment T_3 , while

raised bed with silver-black polythene mulch (T_4) registered significantly more number of cobs plant⁻¹, and weight cob⁻¹ than rest of the treatments except treatments T_3 , T_5 and T_6 for number of cobs plant⁻¹ and treatment T_6 for weight cob⁻¹, which remained statistically on par with treatment T_4 . Significantly maximum green cob and green fodder yield was recorded in treatment of flat bed with silver-black polythene mulch over no mulch treatments and remained statistically at par with other mulch treatments. Similar increase in growth attributes and yield attribute and yield was reported by Ehsanullah *et al.* (2014) ^[1] in aerobic rice.

Table 2: Growth attributes, yield attributes and yield of sweet corn as influenced by different treatments (mean of 3 years).

Treatments	Plant height (cm)	No. of leaves plant ⁻¹	No. of cobs plant ⁻¹	Weight cob ⁻¹ (kg)	Green cob yield (q/ha)	Green fodder yield (q/ha)
T ₁ Flat bed with no mulch	155.39	12.25	1.00	0.331	253.74	257.24
T ₂ Raised bed with no mulch	152.28	12.43	1.02	0.368	251.07	251.16
T ₃ Flat bed with silver-black polythene mulch	174.05	13.38	1.07	0.412	308.59	318.94
T ₄ Raised bed with silver-black polythene mulch	170.78	13.21	1.12	0.457	306.18	316.83
T ₅ Flat bed with black polythene mulch	172.23	12.89	1.05	0.408	299.87	315.73
T ₆ Raised bed with black polythene mulch	168.78	13.00	1.07	0.444	298.82	311.17
SEM ±	0.30	0.12	0.02	0.006	4.19	6.13
C. D. at 5 %	0.94	0.35	0.07	0.02	11.89	17.38
General Mean	165.59	12.86	1.05	0.403	286.38	295.18

This increase in values of growth and yield attributes on plastic mulch might be due to effective weed control, which had reduced the competition of weeds with sweet corn crop for space, water, light and nutrients. Thus more space, water, light and nutrients were available for the better growth and development of crop which resulted into higher values of growth and yield attributes. Similarly, increase in minimum soil temperature and soil moisture content in the upper portion of the soil, provided an ideal environment for vigorous growth of the plant. Significant improvement in the growth characters and yield attributes under the polythene mulch may resulted in higher green cob yield and green fodder yield of sweet corn.

Effect on growth attributes, yield attributes and yield of green gram

Data presented in table 3 implies that, plant height, number of pods plant⁻¹, seed and stover yield of green gram was significantly influenced due to different treatments. Significantly higher plant height and number of pods plant⁻¹ was observed in treatment of raised bed with silver-black polythene mulch (T₄) over rest of the treatments, except treatments T₃, T₅ and T₆ for plant height and treatment T₆ for number of pods plant⁻¹, which

behaved statistically in similar manner with treatment T₄. In case of seed and stover yield, treatment flat bed with silver-black polythene mulch (T₃) found to be statistically superior over rest of the treatments, except treatments T₄, T₅ and T₆ for seed yield and treatment T₅ for stover yield, which remained statistically at par with treatment T₃. Similar increase in growth attributes and yield attribute and yield was reported by Ehsanullah *et al.* (2014)^[1] in aerobic rice.

This increase in values of growth and yield attributes on plastic mulch might be due to effective weed control, which had reduced the competition of weeds with green gram crop for space, water, light and nutrients. Thus more space, water, light and nutrients were available for the better growth and development of crop which resulted into higher values of growth and yield attributes. Similarly, increase in soil moisture content in the upper portion of the soil, provided an ideal environment for vigorous growth of the plant. The beneficial effect of plastic mulch on growth attributes and yield attributes have been also noticed by Ehsanullah *et al.* (2014)^[1] and Iqbal and Ali (2014)^[2]. Significant improvement in the growth characters and yield attributes under the polythene mulch may resulted in higher seed and stover yield of green gram.

Table 3: Growth attributes, yield attributes and yield of green gram as influenced by different treatments (mean of 3 years).

Treatments	Plant height (cm)	No. of pods plant ⁻¹	Seed yield (q/ha)	Stover yield (q/ha)	Rice grain equivalent yield of system (q/ha)
T ₁ Flat bed with no mulch	52.41	12.45	10.65	28.74	251.48
T ₂ Raised bed with no mulch	51.72	13.07	9.62	25.02	246.57
T ₃ Flat bed with silver-black polythene mulch	66.66	18.40	15.38	40.22	315.44
T ₄ Raised bed with silver-black polythene mulch	67.42	22.02	15.01	37.20	315.79
T ₅ Flat bed with black polythene mulch	66.88	19.28	14.51	37.70	305.66
T ₆ Raised bed with black polythene mulch	66.84	21.33	14.33	35.73	306.00
SEm ±	1.25	0.79	0.45	0.92	3.04
C. D. at 5 %	3.55	2.24	1.26	2.62	8.62
General Mean	61.99	17.76	13.25	34.10	290.16

Rice-grain equivalent yield of the system

It is clear from the data presented in Table 3 that rice-grain equivalent yield of rice-sweet corn-green gram cropping system was influenced significantly by different treatments. Significantly higher rice equivalent yield was recorded in

treatment of raised bed with silver-black polythene mulch (T₄) over rest of treatments except treatment flat bed with silver-black polythene mulch (T₃) which behaved statistically similar with T₄.

Table 4: Economics of rice-sweet corn-green gram cropping system as affected by different treatments at input cost

Treatments	Gross returns (Rs.)	Input cost (Rs.)	Net returns at input cost (Rs.)	B : C at input cost
T ₁ Flat bed with no mulch	644566	222926	421640	2.89
T ₂ Raised bed with no mulch	632112	217955	414157	2.90
T ₃ Flat bed with silver-black polythene mulch	810327	182311	628015	4.44
T ₄ Raised bed with silver-black polythene mulch	811253	177340	633913	4.57
T ₅ Flat bed with black polythene mulch	785372	182311	603061	4.31
T ₆ Raised bed with black polythene mulch	786284	177340	608943	4.43

Table 5: Economics of rice-sweet corn-green gram cropping system as affected by different treatments at total cost

Treatments	Gross returns (Rs.)	Total cost (Rs.)	Net returns at total cost (Rs.)	B : C at total cost
T ₁ Flat bed with no mulch	644566	362934	281632	1.78
T ₂ Raised bed with no mulch	632112	355242	276871	1.78
T ₃ Flat bed with silver-black polythene mulch	810327	344666	465661	2.35
T ₄ Raised bed with silver-black polythene mulch	811253	339203	472050	2.39
T ₅ Flat bed with black polythene mulch	785372	340507	444865	2.31
T ₆ Raised bed with black polythene mulch	786284	335042	451242	2.35

Economics

Data on economics of rice-sweet corn-green gram cropping system as affected by various treatments at input cost and at total cost are furnished in Table 4 and 5 respectively. An examination of data reveals that flat bed without mulch incurred the highest

input cost and total cost followed by raised bed without mulch. At both input and total cost higher gross returns, net returns and B: C was recorded in raised bed with silver-black polythene mulch followed by flat bed with silver-black polythene mulch.

Conclusion

Direct seeded dibbled rice-sweet corn-green gram cropping system grown on raised bed with silver-black polythene mulch recorded higher system rice grain equivalent yield, gross returns, net returns and benefit cost ratio followed by flat bed with silver-black polythene mulch.

References

1. Ehsanullah, Qamar R, Kalim M, Rehman A, Iqbal Z, Ghaffar A, et al. Growth and economic assessment of mulches in aerobic rice (*Oryza sativa* L.). J Agric Res. 2014;52(3):395-406.
2. Iqbal MA, Ali S. Evaluation of yield and yield components of aerobic fine rice (*Oryza sativa* L.) as influenced by different mulches and planting patterns. Am Eurasian J Agric Environ Sci. 2014;14(10):1089-1094.
3. Mahale AM, Satpute GN, Mahurkar DG, Bhadane RS, Dusane SM. Effect of polythene mulch on morphological parameters and yield of groundnut (*Arachis hypogaea* L.). Indian J Agron. 2002;41(1):178-182.
4. Sharma RP, Pathak SK, Singh RC. Effect of nitrogen and weed management in direct-seeded rice (*Oryza sativa* L.) under upland conditions. Indian J Agron. 2007;52(2):114-119.