https://doi.org/10.29321/MAJ.10.A02948

Madras agric. J. 66 (4) : 246—249, April, 1979.

Efficacy of Different Mulches in Conserving Soil Moisture in Black Soil

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Investigations were carried out at the All India Coordinated Research Project for Dryland Agriculture, Kovilpatti, to study the effect of mulching on soil moisture. Though the effectiveness of mulching in conserving soil moisture is well understood, its effect on the yield of cotton (MCU. 6) Kapas is still not quite clear. Among the various treatments no one particular mulch was outstanding in any of the 3 years in conserving soil moisture in blacksoil.

Evaporation from soil surface wastes large amounts of water, one fourth to one half of the water last from a crop is evaporated from the soil surface. Moisture conservation is greatly increased with imposition of mulches on soil surface. Though the effectiveness of mulching in conserving soil moisture is well understood, its effect on the yield of crop is still not quite clear.

Umrani, *et al.* (1973) reported that mulch as additional input under dry-farming condition helped to develop the plant properly which reflected yield by about 28 per cent in case of sorghum grain and in case of fodder 18 per cent Bombay dry farming method. When mulch was used between crop rows intercultivations were not given and hence there was a saving of about Rs. 30/- per hectare. This saving is considered to fairly well balance the cost of handling and spreading mulch. Hazra, *et al.* (1973) have stated that the mulches (Polythene sheet and wheat straw) reduced evaporation from soil surface and thereby improved soil moisture status at the sowing time of wheat in rabi season and consequently increase seedling emergence. Soil bulk density decreased while organic carbon content of the soil and infiltration of water in soil increased under both the mulches (Polythene and straw) Tiwary, *et al.* have reported that mulching increased the wheat grain yield significantly ie., 28 per cent over no mulch. In this paper results of an experiment conducted for 3 years (rabi 1671-72, 72-73 and 73-74) at All India Coordinated Research Project for Dryland Agriculture, Kovilpatti to study the efficacy of different soil mulches in conserving soil moisture in blacksoil are presented.

MATERIAL AND METHODS

The standard experiment "Mulching experiment on cotton MCU. 6 was laid out in the blacksoil area of cotton and Millets Experiment Station, Kovilpatti in

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a randomized block design replicated four times with seven treatments namely M_1, no mulchus, (Normal cultivation) M_2-stubble mulch, (Sorghum stubbles) M_3-straw mulch (Bajra straw) M_4-paddy husk mulch, M_5-saw dust mulch, M_6-groundnut shell mulch and M_7-no mulch with shallow furrow forming at fresh hoeing (4th week stage). A quantity of mulch to give a 1 cm cover was used.

a) **Study of soil moisture:** Soil samples were drawn from each plot at two different depths viz., 0-15cm, 15 to 30 cm at the time of sowing and thereafter at definite physiological stages of the crop growth, squaring, flowering, roll development and bursting. Soil samples were examined for moisture content by gravimetric method and the percentage of moisture on oven dry basis were used for statistical analysis.

RESULTS AND DISCUSSION

From Table I and II it could be seen that among mulches tried during 1971-72 M_6(Groundnut shell mulch) conserved the highest moisture per cent (28.34%) followed by M_3 (straw mulch 23.14%) M_5 (Saw dust mulch 23.10%) M_2 (Stubble mulch 23.05%) M_1 (no mulch normal cultivation 22.97%) M_7 (Shollow furrow forming 4th week stage 22.91%) and M_4 (Paddy husk mulch 22.68%) but M_6 (Groundnut shell mulch) was on par with other mulches.

In rabi 1972-7 M_7 (shallow furrow forming 4th week stage) conserved the highest moisture 19.4 per cent followed by M_5 saw dust mulch 19.03 per cent. M_3(straw mulch 19.03%) M_6 (Groundnut shell mulch 18 91%) M_4 (Paddy husk mulch 18.71%)M_1(No mulch normal cultivation 18.33%) and M_2 (stubble mulch 18.21%). Though, M_7 (shallow furrow forming 4th week stage) conserved the highest moisture 19.04 per cent it is seen that is on par with all other mulches except M_1 (no mulch normal cultivation) and stubble mulch which are inferior to other mulches in conserving soil moisture.

In rabi 1973-74 M_5 (saw dust mulch) conserved the highest moisture (30.33%) as confined by Tiwary (1970) followed by groundnut shell mulch (30.41%) stubble mulch (30.21%). No mulch (normal cultivation (29.97%)

TABLE I. Statistical analysis of the efficacy of different mulches

Year of the trial	Details of soil sampling	Results	S.E.	C.D. (P:0.05)
Rabi 1971-72	Soil samples were drawn from 0-15 cm and 15-30 cm at the time of sowing and thereafter once in 15 days till harvest	M6 M3 M5 M2 M1 M7 M4	0.30	0.59
1972-73	-do-	M7 M5 M3 M6 M4 M1 M2	0.22	0.51
1973-74	Soil samples were drawn at 0.15 cm and 15-30 cm at the time of sowing and thereafter at definite physiological stages	M5 M6 M2 M1 M7 M3 M4	0.31	0.85

TABLE II. Percentage of moisture conserved by different mulches and yield of kapas

Name of mulches year	No mulch normal cultivation M1		Stubble mulch M2		Straw mulch M3		Paddy husk mulch M4		Saw dust mulch M5		Groundnut shell mulch M6		Shallow furrow M7	
	% of moisture	Yield Kg/ha	% of moisture	Yield Kg/ha	% of moisture	Yield Kg/ha	% of moisture	Yield Kg/ha	% of moisture	Yield Kg/ha	% of moisture	Yield Kg/ha	% of moisture	Yield Kg/ha
Rabi							@							
1971-72	22.97	190.8	23.08	211.4	23.14	184.2	22.68	341.0	23.10	105.2	28.34	243.0	22.91	177.0
1972-73	18.33	760.0	18.21	883.0	19.03	853.0	@ 18.75 *	839.0	19.02	880.0	18.91	758.0	19.04	846.0
1973-74	29.97	297.0	30.26	336.0	29.71	341.0	29.45	307.0	30.93	347.0	30.41	382.0	29.26	395.0
Mean for 3 years	23.42	413.0	23.85	477.0	23.96	459.0	—	—	24.35	444.0	25.89	461.0	23.97	473.0

Note :- @ Paddy husk mulch * Weed mulch

shallow furrow forming 4th week stage 29.96 per cent and weed mulch 29.45 per cent but, the groundnut shell mulch is seen on par with all other mulches as in the previous years report stated above.

From the consolidated statistical analysis for the three years moisture data, it was proved that there was no significant difference among the various mulches in conserving soil moisture. It means that the mulches were all superior to no mulch, but did not differ among themselves in mulching efficiency.

From the Table II though there was slight increase in the yield of cotton kapas due to the effect of different mulches for the 3 years, the yield of kapas increase due to the effect of mulches was not statistically significant in any year. During summer 1975, the crops namely cowpea (C. 152) and sunflower (EC. 68415) were raised in the groundnut shell mulched plots as well as in the control plots. There was no yield obtained from both the crops raised in the control plots but about 63 kg/ha of sunflower seeds and 99 kg/ha of cowpea seeds were obtained from the groundnut shell mulched plots.

However, the mean for 3 years for groundnut shell mulch is 25.89 per cent which has recorded higher moisture than the other mulches namely saw dust mulch (24.35%) shallow furrow forming (23.97%) straw mulch (23.96) stubble mulch (23.85%) and no mulch(23.42%). From the above results and discussion no one particular mulch was outstanding in any of the three years in conserving soil moisture in blacksoil.

The financial assistance and guidance given by the Indian Council of Agricultural Research in the working of All India Coordinated Research Project for Dryland Agriculture, Kovilpatti are thankfully acknowledged by the author.

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