633:551.584

A NOTE ON THE EFFECT OF PADDY STRAW MULCH ON MICROCLIMATE, GROWTH AND DEVELOPMENT OF SUMMER GREENGRAM CROP

An experiment was conducted at Zonal Agricultural Research Station of Jawaharlal Nehru Krishi Vishwa Vidyalaya, Raipur campus to study the effect of paddy straw mulch on microclimate, growth and development of greengram (Mung) crop during the summer season of 1983.

Greengram crop was sown in a 40×40 m plot with a row spacing of 25 cm. Paddy straw mulch was applied at the rate of 4 tons/ha in half of the field on the 13th day after sowing when the seedlings were well established. A fertiliser dose of 10 kg N, and 20 kg P_2O_5 per hectare was applied as basal.

2.1. *Temperature and vapour pressure gradients*

The temprature gradients under mulched plot were lower during the seedling and vegetative stages and higher during reproductive and maturity stages with a pronounced difference in the latter stages. Contrary to

TABLE 1

Soil moisture depletion pattern in different layers of mulched and no mulch plots

Period (1983)	Treatment	Soil depth (cm) 0-10	10-20	20-40	Total
	Moisture depletion (mm)				
2-11 Apr	Mulch	26.4	2.0	1.2	29.6
	No mulch	19.7	13.6	5.0	38.3
12 Apr	Irrigated the field				
13-26 Apr	Mulch	23.3	13.5	15.3	52.1
	No mulch	14.3	9.8	10.7	34.8
27-28 Apr	Irrigated the field				
29 Apr to 13 May	Mulch	19.7	18.9	27.3	65.9
	No mulch	30.4	20.5	24.6	75.6
14-15 May	Irrigated the field				
16-28 May	Mulch	29.1	17.3	10.5	56.9
	No mulch	27.5	9.0	5.4	41.9

TABLE 2

Crop growth characteristics of greengram crop in mulched and no mulch plots

Crop parameter	Treatment	Crop growth stages† Seedling	Vegetative	Reproductive	maturity
Height (cm)	Mulch	13.4*	33.0*	40.6*	54.9*
	No mulch	12.3	31.1	37.0	45.9
LAI	Mulch	0.27*	2.85*	3.63**	—
	No mulch	0.21	1.53	2.78	—
Biomass production (kg/ha)	Mulch	520	560	660	1,740
	No mulch	335	330	320	2,070
Evapotranspiration (mm)	Mulch	56.2	197.7	167.9	217.1
	No mulch	105.7	277.0	195.5	213.5
Water use efficiency (kg/ha/mm of ET)	Mulch	9.2	2.8	4.9	8.0
	No mulch	3.1	1.2	1.6	9.2

†In each growth period separatively

*Significant at 1% level, **Significant at 5% level

temperature gradients, the vapour pressure gradients were higher in mulched crop during seedling and vegetative stages and lower during the other two stages.

The lower temperature and higher vapour pressure gradients in mulched crop during seedling and vegatative stages were the result of restricted evapotranspirational losses due to application of mulch. The situation was reversed during the other two stages, *viz.*, reproductive and maturity stages as the fully developed crop canopy nullified the effect of mulch.

Thus, the luxurient growth of greengram crop due to application of mulch had brought significant microclimatic changes in the mulched plot as compared to no mulch plot.

2.2. *Soil moisture depletion pattern*

The soil moisture depletion pattern from sowing to the end of reproductive stage at 0-10, 10-20 and 20-40 cm soil layers in mulched and no mulch plots is shown in Table 1.

Except during the initial period (before the application of mulch) the soil moisture depletion from 20-40 cm layer was always higher in mulched plot as compared to no mulch plot. The luxurient crop growth in mulched plot resulted in higher production of below ground biomass and tapped soil moisture from the deeper layers.

2.3. *Crop growth*

The crop growth characters during different growth ages of greengram crop under mulch and no mulch eatments are shown in Table 2. The height and leaf area index were significantly (1% level) higher in mulched plot than in no mulch plot right from the seedling stage. However, the LAI was significant at 5% level only at reproductive stage because the mulch effect was nullified after full vegetative growth of the crop in no mulch plot. The biomass production was also higher in mulched plot from seedling to reproductive stages and was later compensated during the maturity stage. Same is the case for evapotranspirational losses. However, due to higher biomass production and lower ET losses in mulched plot, the water use efficiency was very much increased due to application of mulch

2.4. *Post harvest observations*

The post harvest observations of the greengram crop in mulched and no mulch plots are as shown below:

Observation	*Mulched plot*	*No mulch plot*
(*i*) Biomass production (gm/m^2)	347.8*	305.7
(*ii*) Pod weight (gm/m^2)	202.3*	176.1
(*iii*) Grain yield (gm/m^2)	139.5*	117.9
(*iv*) Evapotranspiration (mm)	638.9	791.7
(*v*) Water use efficiency (kg/ha/mm of ET)		
(a) Total biomass	0.54	0.39
(b) Grain yield	0.22	0.15

* Significant at 1% level

The total evapotranspiration in the mulched plot was 638.9 mm as against 791.7 mm in no mulch plot (a decrease of 19 per cent). However, the water use efficiency increased by 38 per cent in biomass production and 47 per cent in grain yield due to application of mulch.

3. The authors are thankful to the Director of Research services, JNKVV, Jabalpur and the Associate Director Research, Zonal Agricultural Research station, JNKVV, Raipur for extending the necessary facilities for this study. The authors are also thankful to Shri T. L. Paliwal, Met. Observer who assisted in taking the observations.

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11 September, 1985