Theme 1
Status and trends of global soil nutrient budget

IMPACT OF MULCHING ON SOIL HEALTH AND PRODUCTIVITY IN PEACH

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INTRODUCTION

World's population is rapidly growing, natural resource pollution is increasing, global warming and climate change are increasing pressure on scarce natural resources. India faced less rainfall, droughts, decreasing crop yield, depletion of ground water resources and imbalance use of fertilizer. Mulching is most reliable method that regulates the soil microclimate, primarily soil moisture and temperature. It reduces evaporation losses, increase soil water holding capacity, microbiological properties of soil. It suppress the weeds in crop plants thus enhancing crop yield and quality.

METHODOLOGY

Soil moisture was measured at weekly intervals at 0- 7.5 and 7.5-15 cm depth by gravimetric method (Black, 1965) . Soil temperature at 7.5 cm and 15 cm depth was measured at alternate days with digital soil thermometer. The occurrence, extent and types of weeds were studied at full bloom, fruit setting, pit hardening and physiological maturity were studied at 0.5 m^2 quadrat at random locations per treatment. Weed infestation was scored as frequency class (Raunkiaer, 1934), Density and frequency was studied by formula given by (Thomas, 1985), abundance and relative density, relative frequency, relative abundance (Mueller-Dombois and Ellenberg, 1974). The soil viable microbial count, was recorded by using the serial dilution standard spread plate technique as suggested by Subbarao (1999). Microbial biomass carbon was determined by soil fumigation extraction method. Soil microbial activity was determined by CO_2 evolution method by Parmer and Schmidt (1964). Respiratory quotient (q) was calculated as the ratio of microbial biomass to soil organic carbon

RESULTS

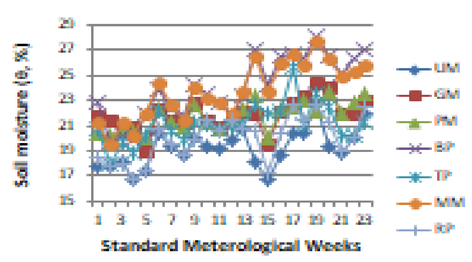


Fig. 1 (a). Effect of mulches on soil moisture content at 0-7.5 cm from bud development to fruit maturity

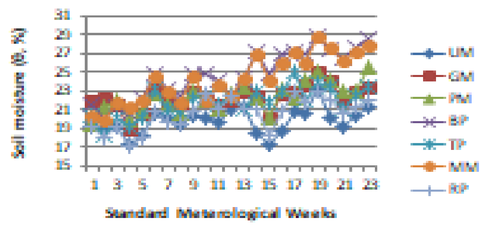


Fig. 1 (b). Effect of mulches on soil moisture content at 7.5-15 cm from bud development to fruit maturity

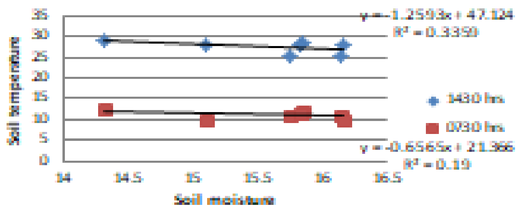
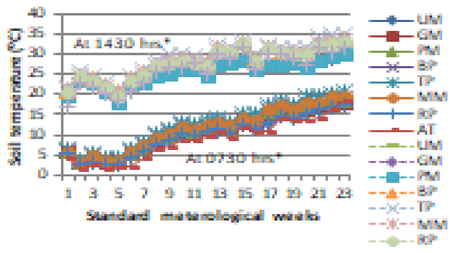
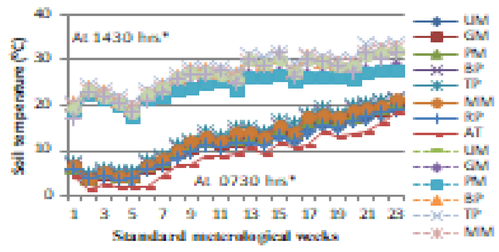


Fig- 3 (a) Relationship between soil moisture and soil temperature at 7.5 cm



ANOVA: single factor test ($P \leq 0.10$) ; At 0730 hrs (P=0.527), at 1430 hrs (P=0.003)

Fig. 2 (a). Mean weekly soil temperature at 7.5 cm depth under different treatments at 0730 and 1430 hr from bud development to fruit maturity



*ANOVA: single factor test ($P \leq 0.10$) ; At 0730 hrs (P=0.556), at 1430 hrs (P=0.006)

Fig. 2 (b). Mean weekly soil temperature at 15 cm depth under different treatments at 0730 and 1430 hrs from bud development to fruit maturity

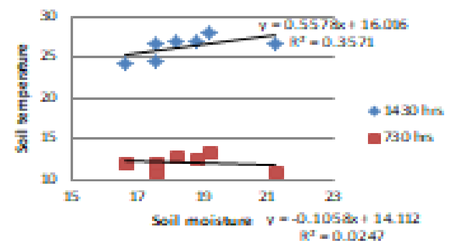
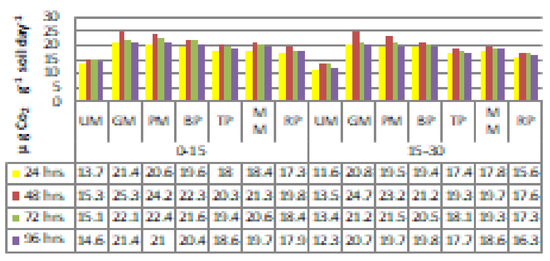


Fig- 3(b) Relationship between soil moisture and soil temperature at 15 cm

Table 2. Effect of mulches on total microbial count, microbial biomass carbon and microbial quotient

Treatment	Depth	Total viable microbial count × 10 ^{6}cfu g^{-1} soil	MBC (µg g^{-1} soil)	q
UM	0-15	112.75	26.38	14.44
	15-30	103.75	20.53	13.12
GM	0-15	139.25	47.70	21.00
	15-30	124.25	31.11	16.78
PM	0-15	131.75	42.80	22.48
	15-30	119.25	28.15	16.03
BP	0-15	127.25	35.78	18.91
	15-30	111.00	25.78	14.48
TP	0-15	119.25	30.83	15.89
	15-30	107.25	23.53	12.58
MM	0-15	124.00	32.20	17.19
	15-30	115.75	26.33	14.56
RP	0-15	115.75	28.15	15.34
	15-30	106.75	23.4	13.32
C.D. (0.05)	0-15	1.25	1.97	NS
	15-30	1.29	1.94	NS

Fig 5. Effect of mulches on microbial activity µg CO_2 g^{-1} soil day^{-1}



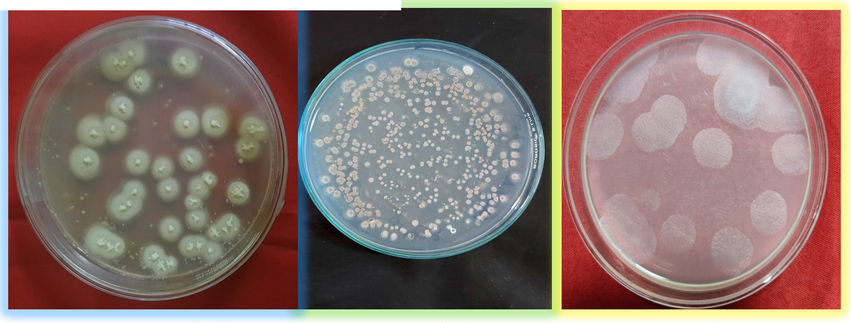
	0-15							15-30						
	UM	GM	PM	BP	TP	MM	RP	UM	GM	PM	BP	TP	MM	RP
24 hrs.	13.7	21.4	20.6	19.6	18	18.4	17.3	11.6	20.8	19.5	19.4	17.4	17.8	15.6
48 hrs.	15.3	25.3	24.2	22.3	20.3	21.3	19.8	13.5	24.7	23.2	21.2	19.3	19.7	17.6
72 hrs.	15.1	22.3	22.4	21.6	19.4	20.6	18.4	13.4	21.2	21.5	20.5	18.1	19.3	17.3
96 hrs.	14.6	21.4	21	20.4	18.6	19.7	17.9	12.3	20.7	19.7	19.8	17.7	18.6	16.3

Table 3(a) Effect of mulches on fruit diameter (cm) and weight (g)

Treatments	Fruit Diameter(cm)	Fruit weight (g)
UM	4.48	73.43
GM	4.72	76.01
PM	4.82	78.68
BP	5.54	82.75
TP	4.42	60.25
MM	5.26	80.44
RP	5.35	81.8
C.D. (0.05)	0.2	2.8

Table 3 (b) Effect of mulches on fruit yield (kg/tree) and fruit productivity (tonnes/ha)

Treatment	Fruit yield (kg/tree)	Fruit productivity (tones/ha)
UM	17.5	13.2
GM	21.5	17.4
PM	24.5	19.1
BP	28.4	22.7
TP	25.3	20.1
MM	27.9	22.32
RP	28.1	22.5
C.D.(0.05)	1.23	1.02



Actinomycetes × 10^3 g^{-1} soil | Bacteria × 10^6 g^{-1} soil | Fungi × 10^2 g^{-1} soil

CONCLUSION

Black mulch enhanced soil moisture, grass and pine mulch moderated soil hydrothermal regimes and improved microbial ecosystem, weed management was done under black mulch and mulch mat. Fruit yield and productivity enhanced significantly under black mulch and recommended practices

• **REFERENCES**
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