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Short communication

Evaluating intercropping systems on the basis of transmitted photosynthetically active radiation

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Intercropping, an important practice of agriculture is known for giving additional yield and returns without appreciable reduction in the yield of main crop. In the sub- mountain, plain and scarcity zones of Maharastra 70 percent of the cultivated area is under rainfed farming within a rainfall range from 400 to 1125 mm that too occurring in two to four months. Sorghum, soybean, pigeonpea, and groundnut are the major rainfed crops grown during *kharif* season.

Sorghum is a short duration, photo and thermo insensitive crop and can be grown throughout the year in this region and finds a place in inter cropping systems. Sorghum + groundnut / pigeonpea /soybean mixed / intercropping systems are becoming popular choice during monsoon season with the farmers. Tollenaar and Brulsema (1988), Siva Kumar and Viramani (1984) reported that intercropping intercepted PAR more efficiently than did the sole crops under rainfed conditions, thus improving radiation / light use efficiency. Bandopadhyay (1987) attributed this to higher LAI under intercrop situation. Research reports in respect of transmitted PAR under intercropping systems in India are very limited and needs a scientific inquest.

An experiment was conducted on the farm area of College of Agriculture at the Centre of Advanced Studies in Agricultural Meteorology (CASAM), Pune during kharif season of 1996. The different treatments and other experimental details with sorghum (SR), pigeonpea (PP), groundnut (GN), soybean (SB) and intercropping combinations remained the same as reported by Singh *et al* (2002). The line quantum sensor was connected to data logger and two values were recorded from each spot and their average was considered. For measurement of incoming PAR the line quantum sensor was positioned facing upwards 30 cm above the top of the canopy. The sensor was placed on the ground across the rows for measuring transmitted PAR (TPAR).

The measurements on TPAR for all the intercropping and sole sorghum treatments (Table 1) show an increasing trend both under sole and intercropping systems .The highest TPAR of 59.5 percent was observed on the 28th DAS due to less leaf area / leaf area index. As leaf area index increased, transmitted PAR decreased (Singh *et al*, 2001) and minimum value of 13.2 percent was recorded on the 70th DAS when the leaf area index was the highest (2.5 to 10.5) for the different treatments. Thereafter, at senescence, as could be expected, TPAR showed

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Table 1: Periodic value of mean transmitted PAR (%) in different treatment

Treatments	Day after sowing									
	28	42	56	70	84	98	112	126	140	156
SR+PP	44.2	36.3	19.5	14.7	25.1	47.1	33.2	34.9	22.2	30.9
SR+GN	62.3	28.5	17.2	9.6	26.1	39.6	25.2			
SR+SB	56.2	33.9	20.3	9.9	25.8	46.8	28.1			
Sole SR	37.4	21.7	14.7	8.3	23.1	33.0	23.3			
Sole PP	74.5	50.7	30.6	31.0	23.9	16.3	23.7	20.7	21.8	42.7
Sole GN	64.2	25.0	15.6	10.6	28.2	38.9				
Sole SB	77.6	32.1	16.1	8.1	26.3	44.9				
SE ±	3.8	1.7	1.9	0.6	1.3	2.2	1.2	2.6	1.1	1.6
C .D at 5%	11.6	5.3	5.8	1.8	-	6.7	4.0	-	-	9.8
Mean	59.5	32.6	19.2	13.2	25.5	28.1	26.7	27.8	22.0	36.8

SR - Sorghum, PP- Pigeonpea, GN- Groundnut and SB- Soybean

an increasing trend both under sole and intercropping systems due to decrease in leaf area index. These results are similar to the findings of Gallo and Daughtry (1986).

The TPAR value was significantly the lowest under sole sorghum during the early growing period upto 28th DAS owing to its rapid growth, where as, it was relatively higher under sole pigeonpea and sole soybean crops around this time because of their slow growth. It was also noticed that TPAR was significantly more under sorghum + pigeonpea intercropping than other intercropping systems and sole crops of sorghum, groundnut and soybean around the 70 DAS because of slower growth of pigeonpea crop.

By 90 days after sowing, the TPAR was significantly lower under sorghum + groundnut, sole sorghum and sole groundnut than sorghum + pigeonpea, sorghum + soybean and sole soybean treatments because of slow growth of pigeonpea under sorghum + pigeonpea intercrop, and senescence of soybean leaves as crop approached maturity. The TPAR values were significantly highest under sorghum+ pigeonpea intercropping at the time of harvest of sorghum on the 112th DAS. It was also observed that at this time TPAR value was significantly higher under sorghum + soybean intercropping than sorghum + groundnut, sole sorghum and sole pigeopea treatments.

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