

Studies on Ber Based Intercropping Systems in the Northern Dry Zone of Karnataka*

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(Received: January, 2002)

Abstract: Field experiment was conducted to find out the suitable ber based intercropping system under rainfed conditions in Northern Dry Zone of Karnataka for two years. Three field crops viz., bengalgram, wheat and safflower were studied for their performance under intercropping and sole cropping system. The grain yield of bengalgram and safflower did not vary significantly between intercropping and sole cropping. The growth of ber tree and its fruit yield also did not vary significantly due to growing of intercrops. Among the intercropping systems the highest net income (Rs.16,330/ha) and benefit cost ratio (3.85) was obtained in ber + bengalgram followed by ber + safflower

Introduction

Ber is planted with wider spacing (5-6 m apart) which provides ideal conditions for growing of field crops in the inter space. Ber needs pruning every year which is usually done in April/May and it takes about four to five months to develop full canopy which provides unrestricted inter space during this period. There are reports that, for the initial four to five years i.e., till ber develops full canopy, intercrops can be profitably grown within the plantation. The information available on intercropping in ber is meagre which is mostly from north India (Singh, 1984 and chundawat, 1993). The northern dry zone of Karnataka is predominantly a rabi track with practice of growing field crops on stored soil moisture. The bulk of ber area (72%) is under this zone. To increase the land use efficiency, there is scope for growing field crops during initial growth stages of ber in between the inter spaces. In view of this, the present investigations were carried out.

Material and Methods

Field experiment was conducted at Water Management Research Centre, Belvatagi located in the northern dry zone of Karnataka in the ber orchard planted during October, 1992 at 6m X 6m plant spacing. Three field crops viz., bengalgram (A-1), wheat (Bijaga yellow) and safflower (A-1) were grown under rainfed conditions in between the inter spaces of ber during rabi seasons of 1994-1995 and 1995-96. The intercrops were sown as per the recommended spacing 1 m away from the ber tree up to the boundary of the plot in north-south direction. For comparison, sole field crops were also grown in the adjoining block. There were totally seven treatments of intercropping and sole cropping, replicated six times in a randomized complete block design. For comparing performance of field crops, split plot design was considered (super-imposed) with ber + field crops as main plot. Treatments and distance from the centre of plot as sub plot treatments . Three distances viz., 1.2 to 1.8 m, 1.8 to 2.4 m and 2.4 to 3.0m. (henceforth called D₁, D₂ and

*Part of the Ph.D. thesis submitted by the senior author to the University of Agricultural Sciences, Dharwad-580 005

D₃) from ber tree in intercropping and from centre of plot in sole cropping were considered. A total rainfall of 465.1 and 585.0 mm, out of this, 214.6 and 231.5 mm was received in September-October months during 1994-95 and 1995-96 respectively. The field crops were harvested treatmentwise and grain/stover yields were recorded. The shaded area at noon of ber tree was measured at the time of sowing of intercrops and at fruit harvesting stage for recording plant spread/canopy coverage. The main stem girth at 0.5 m above ground level at fruit harvesting stage of ber was recorded.

Results and Discussion

Among the field crops, grain yield of safflower was the highest both in sole and intercropping system followed by bengalgram (Table 1). The grain yield of bengalgram and safflower did not vary significantly between intercropping and sole cropping system. Only grain yield of wheat was reduced significantly in intercropping. However, the magnitude of

reduction was only 14.1 per cent. All the field crops recorded significantly higher grain yield at D₃ compared to D₁. Further the grain yield of wheat and safflower recorded at D₂ was also significantly lower compared to D₃. The interaction effects of cropping system and distances on grain yield of all the field crops were not significant. The better performance of safflower and bengalgram under stored soil moisture conditions during rabi season in northern dry zone of Karnataka have been proved in cropping system studies conducted earlier (Ital, 1987). The equal performance of field crops in intercropping system could be attributed to the absence of competition for moisture, light and nutrients between the ber and intercrops. The ber trees were young and there was enough inter space available for growth of intercrops and light was also penetrating through the canopy of ber. Studies conducted elsewhere also indicated similar results (Pareek, 1983; Singh, 1984 and Atul Chandra *et al.*, 1994).

The plant spread per canopy coverage of ber did not vary significantly due to growing of

Table 1. Grain yield (q/ha) of field crops as influenced by cropping system and distance

Treatments	Bengalgram	Wheat	Safflower
Cropping system			
Ber + Intercrops	7.55	6.80	8.47
Sole Field Crops	8.00	7.92	9.30
S.Em ±	0.20	0.28	0.17
C.D.(0.05)	NS	0.83	NS
Distance			
D ₁	7.11	6.39	8.05
D ₂	8.00	7.22	8.89
D ₃	8.22	8.33	9.72
S.Em±	0.22	0.33	0.20
C.D.(0.05)	0.67	0.94	0.58
Interactions			
S.Em±	0.33	0.47	0.29
C.D.(0.05)	NS	NS	NS

NS-Non Significant

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intercrops compared to growing of ber alone during both the years (Table 2). During 1994-95, the canopy coverage was in the range of 5.89 to 6.98 m² at the time of sowing of intercrops. Subsequently, at fruit harvesting stage, it increased to 30.9 to 33.6 per cent of the total allotted area per plant respectively. During 1995-96, at fruit harvest stage the average canopy recorded was in the range of 21.43 to 22.68 m² corresponding to 59.5 to 63.0

per cent area allotted to each ber tree. The variations in the main trunk girth of ber were not influenced by different cropping systems during both years significantly. The girth of ber recorded in various cropping systems was in the range of 16.52 to 18.12 cm and 25.02 to 27.25 cm during 1994-95 and 1995-96 respectively.

The ber yield recorded in ber alone treatment was 27.12 q per ha which was

Table 2. Growth characters of ber as influenced by different cropping systems.

Cropping systems	1994-95			1995-96		
	Plant spread(m ²)		Trunk girth(cm)	Plant spread (m ²)		Trunk girth (cm)
	Stage I	Stage II		Stage I	Stage II	
Ber + Bengalgram	6.05 (16.8)	11.25 (31.2)	18.12	13.58 (37.7)	21.43 (59.5)	25.02
Ber + Wheat	6.98 (19.4)	11.12 (30.9)	16.95	12.32 (34.2)	22.68 (63.0)	26.52
Ber + Safflower	6.68 (18.5)	12.11 (33.6)	16.52	12.76 (35.4)	22.19 (61.6)	27.25
Sole Ber	5.89 (16.4)	11.56 (32.1)	16.77	12.65 (35.1)	21.62 (60.0)	26.62
S.Em±	0.73	0.85	0.65	0.57	0.62	1.21
C.D.(0.05)	NS	NS	NS	NS	NS	NS

NS : Non Significant

Stage I= at sowing of intercrops, Stage II = at ber fruit harvest

Figures in parenthesis indicate per cent area to the total allotted area per tree

statistically on par with the fruit yield obtained under various intercropping systems. Considering only the area covered between the ber tree rows by the intercrops, safflower recorded the highest grain yield of 5.09q per ha followed by bengalgram (4.75q/ha). However, wheat recorded higher stover yield (14.45 q/ha) than bengalgram (12.96 q/ha). Similar trend both in grain as well as stover yield were observed even after considering additional area covered by intercrops between the ber trees. Among the sole field crops also, safflower recorded the

highest grain and stover yield (8.69 and 24.45 q/ha).

The net income in ber + bengalgram was the highest (Rs.16,330/ha) followed by ber + safflower (Rs.14,840 /ha). The net income recorded in these two intercropping systems was significantly higher compared to net income obtained in sole ber/field crops. However, the highest benefit cost ratio was recorded in sole ber (4.04) closely followed by ber + bengalgram (3.85). The higher monetary returns obtained under intercropping of ber are in line with Singh (1984) and Korwar *et al.*(1988).

Table 3. Economic yield (q/ha) and monetary returns of different cropping systems

Treatments	Ber fruit yield	Field crop yield		Net income (Rs/ha)	Benefit Cost ratio
		Grain	Stover		
Ber + Bengalgram	28.05	4.75* (6.62)**	9.43 (12.96)	16,330 (17,520)	3.85 (3.66)
Ber + Wheat	27.24	4.02 (6.13)	9.37 (14.45)	13,450 (14,025)	3.57 (3.38)
Ber + Safflower	26.14	5.09 (7.71)	13.41 (20.00)	14,840 (16,485)	3.66 (3.58)
Sole Ber	27.12	-	-	12,250	4.04
Sole Bengalgram	-	7.64	16.56	5,630	2.97
Sole Wheat	-	7.28	17.80	2,200	2.07
Sole Safflower	-	8.69	24.45	5,485	3.11
S.Em±	1.18	-	-	564 (543)	-
C.D.(0.05)	NS	-	-	1633 (1569)	-

NS : Non Significant

* Considering the area covered by intercrops between ber tree rows only

** Considering the area covered by intercrops between ber tree rows + between trees

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