Journal of Spices and Aromatic Crops
Vol. 14 (1) : 61-64 (2005)

Indian Society for Spices

Evaluation of leguminous vegetables as intercrops in pruned fields of jasmine (*Jasminum sambac* Ait.)

M Lakshminarayanan, K Haripriya[1], K Manivannan & S Kamalakannan

Department of Horticulture, Faculty of Agriculture
Annamalai University
Annamalainagar – 608 002, Tamil Nadu, India.
E-mail: priya_narayan@sancharnet.in

Received 17 August 2004; Revised 22 January 2005; Accepted 04 March 2005

Abstract

Investigations on intercropping of leguminous vegetables in a pruned field of jasmine (*Jasminum sambac*) carried out in a farmer's field at Keezakundalapadi (Cuddalore District, Tamil Nadu), indicated that intercropping pruned jasmine with double rows of vegetable cowpea (*Vigna unguiculata*) fetched the highest equivalent yield of jasmine (5,393 kg ha^{-1}), land equivalent ratio (1.99), net returns (Rs. 1,44,113 ha^{-1}) and benefit-cost ratio (3:1).

Key words: cluster bean, cowpea, dolichos bean, intercropping, jasmine, *Jasminum sambac*.

Though jasmine (*Jasminum sambac* Ait.) flowers throughout the year in Tamil Nadu, the peak harvest coincides with summer months. Therefore it is a common practice to prune the bushes to 45 cm height during lean period (November–February) for production of more laterals during the succeeding season. The jasmine fields after pruning are mostly left vacant except in few places where farmers raise blackgram or greengram on a limited scale for home consumption. Owing to the advantages of leguminous vegetables for their short-duration and fixation of atmospheric nitrogen, vegetable cowpea (*Vigna unguiculata* (L.) Walp.), cluster bean (*Cyamopsis tetragonaloba* (L.) Taub) and dolichos bean (*Dolichos lablab* (Roxb.) L. var. Typicus) were evaluated as intercrops in a pruned field of jasmine. The study aimed at boosting the total productivity per unit land area through judicious utilization of available resources besides residual build up of soil nutrients and providing additional revenue to jasmine growers during non-flowering period.

The experiment was conducted during November 2003 to January 2004 in a farmer's field at Keezhakundalapadi village (Cuddalore District, Tamil Nadu). The soil was sandy loam in texture with pH 6.6 and available N, P and K of 180, 17 and 270 kg ha^{-1}, respectively. Five year old jasmine plants uniformly spaced at 2 m x 2 m were chosen and the crop was raised purely under rainfed conditions. Individual plot size was 36 m^2 containing 9 bushes $plot^{-1}$. A randomised block design with 10 treatments and 3 replications was adopted. Three intercrops namely, Arka Garima of vegetable cowpea, Pusa Naubahar of cluster bean and Sree Ganesh of dolichos bean were sown as single

[1]Corresponding author

row, double rows and by broadcasting in the inter-row spaces of jasmine. Spacing adopted for intercrops were: single row planting – 30 x 30 cm and double row planting – 45 x 30 cm (population per plot of 16 m^2: 49 and 56 plants, respectively). The pruned bushes were incorporated with farm yard manure @ 25 t ha^{-1}, neemcake @ 5 t ha^{-1} and NPK @ 75:150:150 kg ha^{-1}. All intercrop treatments received N, P_2O_5 and K_2O @ 60:80:60 kg ha^{-1}. Seeds of intercrops were coated with slurry of *Rhizobium* sp. culture prepared in rice gruel (10 g kg^{-1} of seeds). Observations were recorded on growth and yield components of main as well as intercrops. The weed population per unit area was also recorded. Further, land equivalent ratio (Willey 1980), income equivalent ratio (Reddy 1986), weed control efficiency (based on weed population) and economics of individual treatments were worked out.

Growth and yield of jasmine were significantly altered due to intercropping (Table 1). Pure crop of jasmine recorded the maximum value for plant height (85.18 cm) which was on par with intercropping of jasmine with cluster bean in single row sowing. The treatments, pure crop of jasmine, jasmine intercropped with vegetable cowpea in single row sowing and jasmine intercropped with cluster bean in both single row and double row sowing were on par with each other for number of sprouted shoots $bush^{-1}$ recorded 90 days after pruning. Usually pruned bushes are manured and irrigated on the same day of pruning in soluble form around the root zone and therefore non-existence of competition due to intercrops for these nutrients would have favoured the spurt in growth of pure crop of jasmine. But with advancement of age, the intercrop suppressed the weed growth in the inter-row space of jasmine according to their population density. The intercrops were ploughed *in-situ* after harvesting of beans/pods. The incorporated biomass got decomposed and they served as a reservoir of organic nutrients aiding in greater production of jasmine laterals and consequently more flower bud formation.

Table 1. Plant growth and yield of jasmine intercropped with leguminous vegetables

Intercropping system	Plant height (cm) 90 DAP	No. of shoots 90 DAP	Leaf area (cm^2) 90 DAP	Flower yield (t ha^{-1})	Weed population m^{-2}	Weed dry weight (g m^{-2})	WCE (%)	Yield of intercrops (t ha^{-1})	Equivalent yield (kg ha^{-1})	LER	IER
Sole jasmine	85.18	134.71	48.81	3.04	84.20	26.39	-	-	3049	-	-
Jasmine + Veg. cowpea (S)	77.38	133.05	45.16	3.75	39.20	13.81	53.44	2.92	4334	1.54	1.43
Jasmine + Veg. cowpea (D)	69.42	128.41	44.72	4.35	24.50	7.60	70.90	5.21	5393	1.99	1.77
Jasmine + Veg. cowpea (B)	61.60	127.21	43.81	3.29	44.10	14.64	47.62	1.85	3660	1.28	1.20
Jasmine + Cluster bean (S)	80.76	135.88	47.73	3.68	41.30	14.72	50.09	2.31	4026	1.52	1.33
Jasmine + Cluster bean (D)	71.92	133.43	46.59	4.05	32.50	10.98	61.40	4.23	4684	1.91	1.54
Jasmine + Cluster bean (B)	62.48	126.21	43.56	3.15	45.60	16.32	45.84	1.81	3421	1.29	1.13
Jasmine + Dolichos bean (S)	72.64	127.75	37.33	3.30	41.30	14.72	50.95	1.77	3742	1.40	1.23
Jasmine + Dolichos bean (D)	69.10	124.21	36.22	3.98	28.40	8.90	66.27	3.11	4757	1.86	1.57
Jasmine + Dolichos bean (B)	61.21	122.00	34.64	3.10	43.50	15.21	48.33	1.21	3402	1.23	1.11
CD (P=0.05)	7.78	3.63	2.12	0.57	6.32	2.64		0.29			

S=Single row sowing; D=Double row sowing; B=Broadcasting; DAP=Days after pruning; LER=Land equivalent ratio; IER=Income equivalent ratio; WCE=Weed control efficiency

Table 2. Economics of intercropping leguminous vegetable crops in pruned field of jasmine

Intercropping system	Cost of cultivation (Rs ha^{-1})	Gross return (Rs ha^{-1})	Net return (Rs ha^{-1})	Benefit: Cost ratio
Sole jasmine	62,436	1,21,600	61,163	1.94
Jasmine + Veg. cowpea (S)	69,216	1,73,384	1,04,167	2.50
Jasmine + Veg. cowpea (D)	71,566	2,15,680	1,44,113	3.01
Jasmine + Veg. cowpea (B)	69,516	1,46,400	76,883	2.11
Jasmine + Cluster bean (S)	71,240	1,61,078	89,837	2.26
Jasmine + Cluster bean (D)	73,820	1,87,398	1,13,577	2.54
Jasmine + Cluster bean (B)	71,640	1,42,420	70,799	1.99
Jasmine + Dolichos bean (S)	71,276	1,49,700	78,423	2.10
Jasmine + Dolichos bean (D)	74,516	1,90,300	1,15,784	2.55
Jasmine + Dolichos bean (B)	71,706	1,41,100	69,393	1.97

S=Single row sowing; D=Double row sowing; B=Broadcasting; DAP=Days after pruning; LER=Land equivalent ratio; IER=Income equivalent ratio; WCE=Weed control efficiency

Intercropping of jasmine with vegetable cowpea and jasmine with cluster bean both in double row sowing were on par with each other for flower yield, recording maximum values of 4.35 and 4.05 t ha^{-1}, respectively. The pure crop of jasmine which yielded 3.04 t ha^{-1} was on par with jasmine intercropped with vegetable cowpea broadcasted, jasmine intercropped with cluster bean broadcasted and jasmine intercropped with dolichos bean in single row sowing and broadcasting.

The predominant weed species were *Trianthema portulacastrum, Phyllanthus* sp., *Cynadon dactylon* and *Cyperus rotundus*. Jasmine intercropped with cowpea significantly reduced the weed population when compared to other intercropping systems (Table 1). Double row cropping of cowpea highly reduced the weed population and produced least amount of weed dry weight m^{-2}. This may be due to the wider spreading habit of cowpea when compared to that of cluster bean and dolichos bean. The highest weed control efficiency based on weed population was observed in this treatment (70.9 %). Similarly, intercropping of pigeonpea with two rows of cowpea reduced the number of weeds and increased the pigeonpea yield (Rana & Pal 1999).

Higher pod yield of intercrops namely, cowpea, cluster bean and dolichos bean were recorded in double row system than in single row or broadcasting system. These observations are similar to the reports of Sarkar & Chakraborthy (1999) in sunflower and greengram (1:2 ratio) intercropping system. Net returns per rupee invested was maximum in jasmine + vegetable cowpea at double row sowing system (1:3) (Table 2). Thus the highest net income of Rs.1,44,113, income equivalent ratio (IER) of 1.8 and land equivalent ratio (LER) of 2.0 could be achieved by resorting to this system of cultivation. The present study thus indicates the possibility of growing leguminous vegetables like vegetable cowpea, cluster bean and dolichos bean as intercrops in pruned jasmine fields. Such a practice provides additional income to the farmers during non-flowering period of jasmine.

References

Rana K S & Pal M 1999 Effect of intercropping systems and weed control on crop weed competition and grain yield of pigeonpea. Crop Res. 17 : 179–182.

Reddy Y V R 1986 Economics of increasing cropping intensity in dryland agriculture in India. Andhra Agric. J. 33 : 303–313.

Sarkar R K & Chakraborthy A 1999 Production potential and economic feasibility of sunflower based intercropping system under different seedling methods in rice fallow land. Indian J. Agron. 44 : 275–280.

Willey R W 1980 The concept of land equivalent ratio and advantages in yields from intercropping. Exp. Agric. 16 : 217–228.