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INTERCROPPING IN RAINFED *RAGI*

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Field experiments were conducted for two years (1982-1983) under rainfed conditions at Regional Research Station, Paiyur to identify the suitable intercrops. Lablab, redgram maize, sorghum, soybean and greengram as intercrops in *ragi* each at 4:1, 6:1 and 8:1 ratio was compared with pure crop of *ragi*. *Ragi* as pure crop gave higher grain yield than in intercropping system. Intercropping systems gave higher net income than the sole crop. Raising *ragi* with greengram at 4:1 ratio gave the highest net income (Rs. 2374/ha) compared to pure crop of *ragi* (Rs. 1991/ha).

Intercropping is a potential agronomic practice that can increase the productivity per unit of land and offer an insurance when the season is unfavourable. The success of any intercropping system would depend upon crop compatibility. Hence it is important to select the intercrops carefully on the basis of their mutual competition and benefit of association.

Ragi (*Eleusine coracana*) is grown in an area of 1.29 Lakh hectares in the northwestern region of Tamil Nadu, comprising Dharmapuri and Salem districts. About 85 percent of this area is rainfed. These districts have the benefit of both south-west and north-east monsoon rains, the distribution being respectively 50 and 35

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per cent to the total annual rainfall. The crop sequence followed in normal years are groundnut (*Arachis hypogaea*) or samai (*Panicum miliare*) followed by horsegram (*Dolichos biflorus*) and long duration ragi or lax panicle sorghum. The optimum sowing period of dry crops during south west monsoon season is July. Invariably intercrops like lablab, sorghum, redgram and maize are grown in rainfed ragi to meet the grain and fodder requirements. The ratio between the main and intercrop is not of any definite proportion. Studies on intercropping at Bangalore revealed that sunflower as intercrop with ragi gave significantly higher monetary return than redgram, soybean and lucerne under rainfed conditions (Anon., 1983). Another study conducted at Bangalore indicated that one row of redgram for ten rows of ragi with 60 cm row spacing for red gram and 30 cm row spacing for ragi gave significantly higher grain yield over a common row spacing of 30 cm (Anon. 1982) Thus an experiment was conducted to identify suitable intercrops with appropriate proportion to benefit the dryland ragi growers to get increased monetary return besides minimising the risk of total failure of the main crop in the event of drought.

MATERIALS AND METHODS

The experiment was conducted for two years at Regional Research Station, Tamil Nadu Agricultural University, Paiyur during kharif, 1982 and 1983 under rainfed condition. The soil type of the experimental

field was red sandy loam with low available N (173 and 142 kg/ha), medium P (16 and 12 kg/ha) and K (213 and 220 kg/ha) representing the soil nutrient status of the tract. The PH was 7.8 and EC was 0.1 mmhos/cm.

The design was randomized block design with three replications. The plot size was 7.2x3.0 m. The treatments followed were lablab (*Dolichos lablab*), redgram (*Cajanus cajan*), maize (*Zea mays*), sorghum (*Sorghum vulgare*) soybean (*Glycine max*) and greengram (*Phaseolus aureus*), as intercrops in ragi each at 4:1, 6:1 and 8:1 ratio and compared with pure ragi crop. Ragi was sown with a spacing of 30x5 cm. The intercrops viz., lablab, redgram sorghum, maize, soybean and greengram were sown in between the rows of the main crop ragi as per the treatments. For instance, in the case of 4:1 ratio, the intercrop was sown between the 4th and 5th line of the main crop and the spacing between plants to plants in all intercrops was 10cm. The intercrops population in 4:1, 6:1 and 8:1 ratio was 30556, 20370 and 10185 plants/ha. A basal application of 32.5:12.8:0 and 42.5:15.2:0 kg of NPK/ha was applied on soil test value to the first and second year crops. The sowing was done on 15.9.82 and 9.8.83 and the harvest was done on first week of January 1983 and second week of November 1983 for the first and second year crops.

Table 1 Ragi and Intercrops Yield

Treatments	Ragi Grain yield kg/ha			Ragi Straw yield kg/ha			Intercrops yield kg/ha			Net income Rs./ha		
	1982	1983	Mean	1982	1983	Mean	1982	1983	Mean	1982	1983	Mean
	Ragi pure crop	2269	1958	2114	2400	2300	2350	—	—	—	2276	1706
Ragi+Labiab 4:1	1218	1583	1401	1400	1650	1525	410	324	367	758	1947	1353
Ragi+Labiab 6:1	1526	1782	1655	1600	1800	1700	300	287	294	1200	2188	1694
Ragi+Labiab 8:1	1514	1738	1625	1600	1800	1700	180	218	199	1146	1962	1554
Ragi+Redgram 4:1	1806	2083	1945	1900	2400	2150	Failed	194	194	1513	2379	1946
Ragi+Redgram 6:1	1852	2065	1959	1950	2400	2175	..	116	116	1596	2158	1877
Ragi+Redgram 8:1	2037	1866	1952	2200	1950	2075	..	51	51	1992	1691	1792
Ragi+Maize 4:1	1478	1690	1584	1500	1700	1600	600	284	442	583	1635	1109
Ragi+Maize 6:1	1838	1861	1850	1900	1950	1925	460	192	326	1815	1779	1797
Ragi+Maize 8:1	1787	1769	1778	1850	1800	1825	240	115	178	1630	1533	1582
Ragi+Sorghum 4:1	1754	1773	1764	1850	1800	1825	322	232	277	1869	1679	1774
Ragi+Sorghum 6:1	2023	1935	1979	2200	2200	2200	140	134	137	2035	1794	1915
Ragi+Sorghum 8:1	2209	1861	2035	2350	2000	2175	78	97	88	2250	1638	1944
Ragi+Soybean 4:1	1773	2020	1897	1800	2450	2125	Failed	81	81	1439	1866	1653
Ragi+Soybean 6:1	1833	1954	1894	1950	2200	2075	..	46	46	1547	1714	1631
Ragi+Soybean 8:1	1866	1796	1831	1950	1900	1925	..	Failed	Failed	1611	1101	1506
Ragi+Greengram 4:1	1806	2014	1910	1900	2300	2100	160	440	300	1787	2960	2372
Ragi+Greengram 6:1	1852	2033	1938	1950	2300	2125	87	370	229	1689	2789	2236
Ragi+Greengram 8:1	2037	2051	2044	2200	2300	2250	51	200	126	1908	2346	2127
SE	244	158										
CD (P=0.05)	495	N.S										

The rainfall received during the crop period was 221 and 367 mm distributed in 17 and 25 rainy days respectively

The varieties used were ragi (Co 11), lablab (Co 9), redgram (DFI 711) maize (Ganga 5), sorghum (Co 24), soybean (Co 1) and greengram (Co 4). For calculating the gross income the following market rates were taken. Ragi, maize and sorghum grain Rs. 150/q. and ragi straw Rs 30/t, lablab, greengram and red gram grain Rs 300/q. soybean grain Rs 200/q.

RESULTS AND DISCUSSION

Among the different intercrops tried, lablab depressed the main crop yield considerably even under wider ratio owing to its profuse vegetative growth (Table 1). Sorghum and Maize at closer ratio (4:1) reduced the ragi yield to the tune of 23 and 35 percent respectively. The depressive effect of sorghum, redgram and greengram was less at the wider ratios tried.

In the second year also lablab and maize has significant depressing effect on *ragi* yield while redgram and greengram in all the ratios had a complementary effect.

The pooled data revealed that the grain yield reduction in *ragi* when greengram was intercropped at 4:1,

6:1 and 8:1 ratios was 10.8 and 3 percent respectively. The yield of greengram was the highest in the closer proportion. The next intercrop which has lesser depressing effect was sorghum at the wider ratio of 8:1.

In terms of net income greengram at 4:1 ratio was the most remunerative. Even under wider ratios, green gram was more remunerative than the other crop studied.

In conclusion it may be stated that intercropping systems gave higher net income than the sole system. *Ragi* pure crop gave the highest yield. *Ragi* grain yield reduction was less in greengram and sorghum in 8:1 ratio than with lablab and maize. Intercropping *ragi* with greengram at 4:1 ratio gave the highest net income (Rs 2374/ha) compared to pure crop of ragi (Rs 1991/ha).

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