

furrow method of irrigation even though the water requirement for alternate furrow method of irrigation is 60-70 per cent of the all furrow method of irrigation.

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PRODUCTION POTENTIAL OF COMPATIBLE FODDER CEREAL-LEGUME MIXTURES IN THE NORTH WESTERN ZONE OF TAMIL NADU

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ABSTRACT

Field experiments were carried out to evaluate the production potential of cereal-legume fodder combinations in the North Western Zone of Tamil Nadu having red sandy loam soils at RRS, Paiyur in 1987 and 1988. Cereal fodders like sorghum, maize, pearl millet and finger millet and legume fodders such as cowpea and soybean were raised as pure and in 1:1 and 2:1 ratios. The experimental results indicated that maize cowpea in 1:1 combination produced 27 tonnes of green fodder with higher per day productivity and protein yield under irrigated conditions.

Agroclimatically North Western Zone of Tamil Nadu comprises Dharmapuri and Salem Districts, predominantly having red sandy loam soil under semiarid farming. Farming in this zone is a mixed enterprise of crops and livestock. The fodder availability is estimated to be around 30.9 lakh tonnes of dry fodder and 4.2 lakh tonnes of green fodder. Estimation has also brought out a deficit of 23.8 lakh tonnes of dry fodder (43.5%) and 10.7 lakh tonnes of green fodder (71.8%) in the North Western zone for productive maintenance of livestock component (Anon.1984).

Raising combination of fodder crops, instead of monocrop of either cereal or legume fodder, would provide a scope for higher yield and good quality fodder. Hence, to increase the fodder production and also to produce highly nutritious and balanced feed for livestock, elaborate study needs to be undertaken.

MATERIALS AND METHODS

Field studies were undertaken to evaluate the best combination of fodder cereal-legume mixtures to obtain higher green fodder yield with better quality under irrigated conditions at Regional Research Station, Tamil Nadu Agril. University,

Paiyur during 1987 and 1988. Experiments were carried out in red sandy loam soils having low available nitrogen, medium available phosphorus and high available potassium. Fodder cereals, viz., sorghum, maize, pearl millet and finger millet and fodder legumes like soybean and cowpea were raised as mono as well as cereal-legume fodder mixtures in 1:1 and 2:1 ratios in randomized blocks design replicated thrice. Fodder crops were raised in 8 m x 5m plots with a spacing of 30 x 10 cm. Harvest was taken up at 50 per cent flowering and the data on green fodder, dry fodder and protein yields and per day fodder productivity were recorded.

RESULTS AND DISCUSSION

Data on greenfodder yield was recorded at harvest and the dry fodder was recorded after sun drying to bring the moisture content to 15-16 per cent. The data on green fodder and dry fodder yields are presented in Table 1.

Results on green fodder yield during 1987 indicated that raising maize + cowpea at 1:1 ratio or at 2:1 ratio resulted in higher (24 t ha⁻¹) green fodder yield. As a monocrop, fodder maize as well as fodder cowpea yielded about 19 tonnes of green

Table 1. Green and dry fodder yields ($t\ ha^{-1}$) of cereal legume mixtures.

Crop/Combinations	Green fodder yield ($t\ ha^{-1}$)			Dry fodder yield ($t\ ha^{-1}$)		
	1987	1988	Mean	1987	1988	Mean
Sorghum	13.4	17.4	15.4	2.6	3.5	3.1
Maize	19.0	20.1	19.6	3.8	4.1	4.0
Cumbu	12.5	19.9	16.2	2.4	3.9	3.2
Ragi	6.8	8.1	7.5	1.5	1.6	1.6
Cowpea	18.7	17.8	18.3	2.7	2.8	2.8
Soybean	2.9	8.2	5.6	0.4	1.2	0.8
Sorghum + Cowpea 1:1	18.6	18.2	18.4	3.7	3.6	3.7
Sorghum + Cowpea 2:1	16.6	19.8	18.2	3.1	3.8	3.5
Sorghum + Soybean 1:1	9.5	20.2	14.9	1.9	4.0	3.0
Sorghum + Soybean 2:1	8.6	20.9	14.8	1.9	4.5	3.2
Maize + Cowpea 1:1	24.1	30.3	27.2	4.4	6.0	5.2
Maize + Cowpea 2:1	23.4	20.0	21.7	4.3	4.0	4.2
Maize + Soybean 1:1	18.2	18.1	18.2	3.6	3.9	3.8
Maize + Soybean 2:1	14.2	18.3	16.3	2.9	4.1	3.5
Cumbu + Cowpea 1:1	16.9	19.7	18.3	3.0	3.5	3.3
Cumbu + Cowpea 2:1	15.9	23.5	19.7	3.0	4.1	3.6
Cumbu + Soybean 1:1	14.0	25.1	19.6	2.7	4.8	3.8
Cumbu + Soybean 2:1	12.8	23.8	18.3	2.6	4.6	3.6
Ragi + Cowpea 1:1	10.6	21.2	15.9	2.0	4.0	3.0
Ragi + Cowpea 2:1	9.5	15.9	12.7	1.7	2.9	2.3
Ragi + Soybean 1:1	5.8	9.9	7.9	1.1	1.8	1.5
Ragi + Soybean 2:1	5.4	9.5	7.5	1.1	1.8	1.5
SE	2.1	1.8	0.75	0.4	0.10	0.30
CD ($P=0.05$)	5.9	5.3	2.13	1.1	0.28	0.85

fodder ha^{-1} which were the highest among the fodder crops raised. However, during 1988 the maize + cowpea at 1:1 ratio had given higher green fodder yield over 2 : 1 ratio. This might be due to the reason that cowpea as 50 per cent component of the fodder crop combination contributed much to the green fodder yield. Pooled analysis of green fodder yield over two years clearly indicated that raising maize + cowpea at 1:1 ratio out yielded all or any other combination of cereal- legume mixtures in green fodder yields.

The data on dry fodder yield indicated that maize + cowpea at 1:1 ratio as well as 2:1 ratio had comparable yield with maize or sorghum as mono fodder crop. Higher proportion of dry fodder yield from monocrop of maize or sorghum as compared to combination with cowpea, might be due to lesser conversion of cowpea as dry fodder yield.

However, pooled analysis of dry fodder yield over two years revealed that maize + cowpea at 1:1 ratio had higher dry biomass production as fodder crop.

Results on crude protein yield are given in the Table 2. Indicated that maize + cowpea at both combinations had higher crude protein yield and were comparable with the crude protein yields of maize + soybean 1 : 1 ratio as well as sorghum-cowpea at 1:1 ratio during 1987 season. Similarly, during 1988 season maize + cowpea fodder combination 1:1 ratio produced highest crude protein yield of $825\ kg\ ha^{-1}$. However, sorghum + soybean as well as maize + soybean at both combinations (1:1 and 2:1) had comparable crude protein yield among themselves. Pooled analysis of the crude protein yield over two years distinctly indicated that raising maize + cowpea at 1:1 ratio had the highest yield. Inclusion of cowpea

Table 2. Protein yield (kg ha^{-1}) productivity ($\text{kg ha}^{-1} \text{ day}^{-1}$) and net return (Rs ha^{-1}) of fodder cereal + legume mixture.

Crop/Combinations	Crude protein yield (kg ha^{-1})			Per day productivity ($\text{kg ha}^{-1} \text{ day}^{-1}$)			Returns Rs ha^{-1}
	1987	1988	Mean	1987	1988	Mean	
Sorghum	231.3	305.4	268.4	212	248	230	2600
Maize	360.0	395.1	377.8	302	287	295	3650
Cumbu]	221.5	355.7	288.6	198	284	241	2800
Ragi	76.0	95.0	85.5	102	116	112	625
Cowpea	358.7	386.8	372.8	297	254	276	3555
Soybean	50.7	154.4	102.6	33	117	75	380
Sorghum + Cowpea 1:1	467.7	476.3	472.0	295	260	278	3340
Sorghum + Cowpea 2:1	356.0	457.5	406.8	263	354	309	3290
Sorghum + Soybean 1:1	241.7	523.4	382.6	151	289	220	2465
Sorghum + Soybean 2:1	211.3	513.9	362.6	127	299	213	2440
Maize + Cowpea 1:1	583.7	824.7	704.2	383	433	408	5500
Maize + Cowpea 2:1	542.3	504.9	523.6	371	286	329	4125
Maize + Soybean 1:1	475.3	514.0	494.7	289	259	274	3250
Maize + Soybean 2:1	370.7	508.6	439.7	225	261	242	2775
Cumbu + Cowpea 1:1	317.0	368.6	342.8	268	281	275	3315
Cumbu + Cowpea 2:1	275.0	441.5	358.3	252	336	294	3665
Cumbu + Soybean 1:1	282.7	495.3	389.0	222	259	241	3640
Cumbu + Soybean 2:1	215.0	406.0	310.5	203	340	272	3315
Ragi + Cowpea 1:1	193.7	323.7	258.7	168	303	236	2715
Ragi + Cowpea 2:1	174.7	261.1	217.9	151	227	189	1915
Ragi + Soybean 1:1	182.0	221.5	201.8	92	141	117	715
Ragi + Soybean 2:1	175.0	224.6	199.5	86	136	111	615
SE	48.8	17.6	30.5				
CD (P=0.05)	129.0	46.5	80.6				

as well as soybean as a component fodder crop with cereal fodders favoured better crude protein yield.

Productivity of cereal + legume fodder combinations assessed in terms of per day productivity of green fodder (kg ha^{-1}) revealed that maize + cowpea at 1:1 ratio resulted in higher productivity. However, cereal fodder in combination with legume fodders like cowpea and soybean resulted in better productivity as reported earlier by Taneja *et al.* (1980). Productivity

assessed in terms of net return also revealed that raising maize + cowpea at 1:1 combination resulted in better return of Rs.5500 ha^{-1} under irrigated conditions.

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