better absorption of both water and nutrients and for ultimate increased yield over others.

Seeds hardened with Calotropis leaf extract at 2 per cent produced taller plants, longer roots, more dry matter production, maximum yield attributes and grain yield as against other seed hardening materials. Application of 2 per cent Calotropis leaf extract resulted in maximum plant height of 193.8 and 193.2 cm and root length of 37.0 and 36.4 cm respectively during 1994-95 and 1995-96. The earhead weight (44.9 and 44.8 g) and earhead grain weight (34.4 and 34.3 g) obtained during the two seasons were also the maximum over other treatments. Among all the treatments maximum grain yield of 1113.7 and 1067.0 kg ha^{-1} was obtained during 1994-95 in the seed hardening method through Calotropis extract. Seed hardening with 2 per cent potassium dihydrogen phosphate reduced growth attributes, yield attributes and grain yield during two years of study. During the two years of study the interaction effect of nutrient management and seed hardening was not significant. Better growth characters such as plant height, root length, dry matter production and yield attributes such as earhead weight, grain weight per earhead and grain yield recorded with Calotropis leaf extract as a seed hardening material might be due to the better hardening effect over the other sources tried. Pre sowing seed hardening possibly might have resulted in the modification of the physiological and biochemical nature of the seed favourably for drought resistance. Eventually this resulted in the absorption of more water due to increase in the elasticity of cells and development of efficient root system (Karivaratharaju *et al.*, 1991).

Efficient root system thus might have helped in the absorption of more water and nutrients from soil improving various plant growth and yield attributes and finally the yield.

Hence, from the present study it is inferred that the application of enriched pig manure @ 875 kg with 40 kg N ha^{-1} as a nutrient source and seed hardening with Calotropis leaf extract at 2 per cent increased the rainfed sorghum growth and yield attributes and grain yield.

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EFFICIENCY OF DUAL CROPPING OF GREEN MANURES WITH MAIZE ON WEED MANAGEMENT

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ABSTRACT

Two field experiments were conducted at Tamil Nadu Agricultural University, Coimbatore during *rabi*, 1994 and *Kharif*, 1995 to investigate the weed suppressing effect of green manures grown with maize as dual crop. The results revealed that raising cowpea as a dual crop with maize at a spacing of 60 x 20 cm not only suppresses the weed growth but also supplies nutrient to the crop, resulting in highest grain yield, (62 q/ha) net return (Rs. 12,006/ha) and BC ratio (2.06) compared to 43.6 q/ha, Rs. 6376/- and 1.55 respectively under sole cropping of maize.

KEY WORDS : Green manure, Dual cropping

Maize is one of the important cereal crops of India and it ranks third after wheat and rice. It is a high yielding cereal crop which gives maximum tonnage per unit area and unit time. Maize is important not only for grain production but also for fodder production. In India the average yield of maize is only 11.25 q ha^{-1} against the world averge of 45 q ha^{-1}.

Among the different factors that cause yield reduction, weeds play an important role. Because of wider spacing, and slow growth of maize during initial stage, weeds grow faster and compete with maize for nutrients and other growth factors. To minimise the weed competition, some of the intercrops may be grown, which can also utilise the space and nutrients very well.

According to Lawrence (1989) a legume cover crop reduced the weed problem by providing shade which inhibited germination of most weed that would otherwise grown on bare soil. Planting a legume cover crop provides number of benefits for the subsequent crop. Dominik (1990) reported that legumes could establish on land surface quickly and smothered the weeds - when it was ploughed *in situ* the crop added nitrogen to the soil to the tune of 40-50 kg N ha^{-1}. He also reported that cowpea showed a greatest promise for weed smothering ability.

Hence the present study was carried out to find the effect of dual cropping of maize + sunnhemp / cowpea as a biological method of weed suppression.

MATERIALS AND METHODS

Field experiments were conducted during *rabi* 1994 and *Kharif* 1995 at Eastern block of Tamil Nadu Agricultural University, Coimbatore to investigate the weed suppressing effect of green manures grown with maize. The experiment was conducted in randomised blocks design with three replications. The soil of the experimental site was clay loam in texture with low, medium and high for available nitrogen (256 kg ha^{-1}), phosphorus (17.8 kg ha^{-1}) and potassium (345 kg ha^{-1}) respectively. The maize variety Co.1, cowpea variety Co.5 and local sunhemp were raised. The treatments included two green manures (cowpea and sunnhemp), two levels of nitrogen 101.3 kg (75% N) and 135 kg (100% N) and two spacings (75 x 16 cm and 60 x 20 cm). A pre-emergence spray of Pendimethalin was given at the rate of 1.5 l/ha. Weed count was taken at 20 and 40 DAS and the weed control efficiency was worked out. The green manure crops were incorporated into the soil 45 days after sowing.

RESULTS AND DISCUSSION

Among the different treatments the weed smothering effect was higher in intercropped maize than in sole maize. The number of weeds was markedly less in maize intercropped with cowpea at a spacing of 60x20 cm along with 100% nitrogen, which was followed by maize + sunnhemp.

Table 1. Effect of treatments on weed control and grain yield

Treatment	Weed density ($No.m^{-2}$)		Weed Control efficiency (%)		Grain yield (q/ha)		Net return ($Rs./ha^{-1}$)		B:C ratio	
	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif
T1 Sole maize, 60x20cm, 100% N	176	186.6	-	-	43.6	43.2	6376	6020	1.55	1.55
T2 Sole maize, 75x16cm, 100% N	188	176.0	-	-	42.9	42.8	5833	5809	1.54	1.53
T3 Maize + Sunnhemp, 60x20 cm, 100% N	29.3	98.6	83.3	47.1	56.4	53.5	10082	9084	1.88	1.79
T4 Maize + Sunnhemp, 60x20 cm, 75% N	42.6	77.3	75.7	58.5	54.0	52.2	8944	8810	1.78	1.77
T5 Maize + Sunnhemp, 75x16 cm, 100% N	38.6	85.3	79.4	51.5	60.3	58.0	11626	10510	2.01	1.91
T6 Maize + Sunnhemp, 75x16 cm, 75% N	34.6	50.6	81.5	71.2	55.5	51.8	9307	8511	1.82	1.75
T7 Maize + Cowpea, 60x20 cm, 100% N	12.0	30.6	93.1	83.6	62.0	59.5	12006	11350	2.06	2.00
T8 Maize + Cowpea, 60x20 cm, 75% N	16 0	44.0	90.9	76.4	54 6	51.6	8672	8326	1.77	1.74
T9 Maize + Cowpea, 75x16 cm, 100% N	16.0	48.0	91.4	72.7	56.1	55.8	9477	8997	1.84	1.79
T10 Maize + Cowpea, 75x16 cm, 75% N	13.3	41.0	92.9	76.7	55.3	48.1	9219	7342	1.82	1.65
SEd	10.0	12.8	NA	NA	1.1	1.4				
CD (P=0 05)	21.2	27.0			3.4	4.2				

NA - Not analysed

Among the two spacings tested both in *rabi* and *Kharif* 60x20 cm spacing recorded better weed control by virtue of closer spacing and denser canopy coverage under intercropped as well as sole cropped situation.

The weed control efficiency was higher (93.1%) during *rabi* and 83.6% during *Kharif)* when maize was raised with cowpea compared to sunnhemp in both the seasons. This is in accordance with the findings of Hosmani (1991). Maize raised with cowpea at a spacing of 60x20 cm along with 100% nitrogen recorded the highest weed control efficiency at 40 DAS in both the seasons. The grain yield was significantly higher in maize raised with cowpea at a spacing of 60x20 cm for the base crop and 100% nitrogen (62 q and 59.5 q ha^{-1} respectively for *rabi* and *Kharif)*. This might be due to the faster growth of cowpea which smothers the weed growth during initial stages and also by supplying nutrients by *in situ* incorporation. The net return (Rs. 12,006/ha^{-1} and Rs. 11,350/ha^{-1} during *rabi* and *Kharif* respectively) and benefit cost ratio of (2.06 and 2.00 were also the highest in this treatment (Table.1).

Cowpea can be the best green manure for dual cropping with maize because it adds more nutrients to the soil and more efficient in smothering weeds.

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ALLOMETRIC RELATIONSHIP IN *Prosopis Juliflora* (SWARTZ) DC. SEEDLINGS.

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ABSTRACT

Studies on alloetric relationship in *Prosopis juliflora* (Swartz) DC. Seedlings revealed that though there was a positive correlation between shoot length and root length, it was not significant as evident from the simple regression model. However, there was a positive significant relationship between shoot weight and root weight of *Prosopis* seedlings indicating that the shoot weight was dependent on its root weight. The above ground dry matter (shoot weight) could be considered as a scientific parameter for the selection of better planting stocks of *Prosopis juliflora.*

KEY WORDS : *Prosopis juliflora*, Allometric relationship, Seedling index

Prosopis juliflora is a leguminous tree species amenable for large scale reclamation of waste lands (saline and alkali soils, degraded soils, barren lands etc.,). It also forms an important multipurpose tree species for marginal and sub-marginal soils where crop productivity is at greater stake. Selection of superior planting stocks (seedlings) is the key for the successful establishment of *Prosopis*.

The seedling attributes of *Prosopis juliflora* such as faster juvenile growth rate, higher number of secondary roots per seedling and maximum biomass production per seedling had profound influence on the superiority of *Prosopis juliflora* over other tree species like *Acacia auriculiformis, Acacia nilotica, Dalbergia sisoo, Eucalyptus hybrid* and *Terminalia arjuna* in a non- saline sodic soils of Utta Pradesh, India (Goel, 1987).

Hence, to find out the fundamental relationship between root and shoot of *Prosopis* seedlings a simple linear regression study was made at the Forest College and Research Institute, Mettupalayam of the Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu (India).

MATERIALS AND METHODS

Prosopis juliflora seeds were treated in hot water (100 ml of water was boiled in a vessel. On removing the vessel from the stove, about 25g