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

seeds of *Prosopis* were immersed immediately). The immersed seeds were kept overnight soaking in the same water for imbibition. Water was drained in the next day morning and the seeds were shade dried. Two to three seeds were sown in each of 500 polypots (35*20 cm size of 400 guage) containing nursery medium (Native soil : Sand : FYM at 3:1:1 ratio). Watering was done immediately after sowing and twice a day thereafter with rose can. On 30th day when seedlings were about 15 cm height, thinning was done leaving only one healthy seedlings per polypot. Thereafter watering was done regularly once in a day., At sixth month all the 500 seedlings were removed from the polypots carefully to secure roots intact by immersing the ball of soil around the roots in a bucket of water.

Then the root and shoot length were measured (Saravanan, 1991). The dry matter production (DMP) of seedlings was estimated by drying the seedlings first in open air and then in hot air oven at 75°C till a constant weight was obtained. The dry weight of both root and shoot were also recorded separately for each seedling. A simple correlation and regression was done between shoot length (Y) and root length (X) as well as between shoot weight (Y) and root weight (X) following the procedures outlined by Snedecor and Cochran (1968).

RESULTS AND DISCUSSION

Eventhough there was a positive correlation between shoot length and root length, it was not significant in the simple regression study as indicated by the following equation (1)

1. $Y_{SL} = 2.060 + 4.916_{RL}$ ($R^2 = 0.326$ NS)

Where, SL = Shoot length ; RL = Root length

The reason for this behaviour needs further study. However, several workers suggested that height of seedlings in many tree species could be considered as a good measure of growth potential (Nair, 1971 ; Chavasse, 1977 and Raj *et al.*, 1982). But this was not observed in the present investigation for *Prosopis juliflora* seedlings.

Interestingly, it was evidently proved from this study that shoot weight of *Prosopis* was very much dependent on its root as indicated by the following equation (2).

2. $Y_{SW} = 0.982 + 0.889_{RW}$ ($R^2 = 0.909^{**}$)

Where,

SW = Shoot weight ; RW = Root weight.

The above results showed that the above ground DMP of shoot (shoot weight) could be considered a scientific parameter for evaluating *Prosopis juliflora* seedlings for the selection of better planting stocks as compared to other parameters like height of seedlings. The above ground DMP of *Prosopis juliflora* seedling was a result of its root density and volume. The dependence of shoot weight on the root might be attributed to the fact that root biomass served as carbohydrate reservoir (source) in the early stage for the above ground biomass (sink). It could also be interpreted that appreciable shoot weight served as an indicator for higher root biomass (root weight). For recording shoot weight, normally the plant has to be destroyed. But, without destroying the *Prosopis juliflora* seedlings, the above ground biomass could be estimated using simple linear regression equations with basal diameter (BD), branch number (BN) and height of the seedling (HS) as independent variables as found out in the following equation

3. $Y_{AB} = -66.695 + 2.875\ HS^{NS} + 15.485\ BN^{**} + 9.179\ BD^{**}$

($R^2 = 0.659^{**}$)

Where, AB = Above ground biomass ;
HS = Height of the seedings

BN = Branch numbers in the seedlings

BD = Basal diameter of the seedlings in the collar region

Hence, it is concluded in the present investigation that the DMP of shoot could be taken as an indicator for the selection of superior seedlings.

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INFLUENCE OF INTERCROPPING AND MULCHING ON CHEMICAL PROPERTIES OF SOIL AND CROP PRODUCTIVITY IN RAINFED COTTON

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ABSTRACT

Field experiments were conducted at the Agricultural Research Station, Kovilpatti to study the effect of intercropping and mulching on chemical properties of soil and productivity of cotton in rainfed situation. The post harvest estimates of the available soil nutrients revealed that depletion of N was more in pre-monsoon sown crops. Intercropping of cotton with blackgram or clusterbean had increased the residual N and organic carbon content of soil, but it depleted more of P. The application of subabul loppings or bajra straw as mulches improved the level of available N, K and organic carbon content. The cotton + clusterbean sown under pre- monsoon and mulched situations recorded higher cotton yield equivalent.

KEY WORDS : Cotton , intercropping, mulching

Legume intercropping has attracted the attention of the agronomists, which may be due to some of the stabilised and speculated advantage of the system such as higher grain yield, greater land use effeciency and improvement of soil fertility through the addition of nitrogen by fixation and excretion from the component legumes (Chatterjee *et al.*, 1989). Due to slow growing nature of cotton in the initial stages, growing of short and early maturing legumes was found ideal and compatible (Rajat De and Singh, 1979). High intensity of rains during the monsoon period and poor infiltration rate of the vertisol provides considerable scope for soil erosion and run-off (Itnal *et al.*, 1994). Surface cover with organic mulches facilitates better infiltration for improving the soil moisture and fertility status under rainfed situation. Hence, the present investigation was undertaken to study the influence of inter-cropping and mulching on the improvement of the soil chemical properties and crop productivity in rainfed cotton.

MATERIALS AND METHODS

Field experiments were conducted during the rabi season of 1993-94 and 1994-95 at Agricultural Research Station, Kovilpatti to study the influence of intercropping and mulching practices on chemical properties of the soil and productivity of cotton under rainfed condition. Treatments consisted of three sowing times viz., Pre-monsoon, monsoon and late-monsoon sowings and three intercropping system viz., sole cotton, cotton + blackgram and cotton + clusterbean as main plot treatments and three mulching practices viz., no mulch, subabul loppings and bajra straw as sub-plot treatments. The experiment was laid out in split-plot design replicated thrice. Cotton cv. MCU 10, blackgram cv. CO5 and clusterbean cv. pusa navbhagar were used as test crops. The crops were sown on 30th September, 14th October and 28th October during 1993-94 and 1994-95 under pre-monsoon, monsoon and late monsoon situation, respectively, by adopting a spacing of 45 cm between rows for pure stand of cotton and 30/60 cm for paired row system at 2:1 ratio for intercropping of cotton. Intra-row spacing of 10 cm and 15 cm were adopted for blackgram and clusterbean respectively. The mulch materials were cut into small pieces and applied at the rate