Range Mgmt. & Agroforestry 37 (1) : 44-49, 2016
ISSN 0971-2070

# Effect of range legumes intercropping and weed management on weed control and fodder productivity of Guinea grass (*Panicum maximum* Jacq.)

**S. N. Ram* and B. K. Trivedi**
ICAR-Indian Grassland and Fodder Research Institute, Jhansi-284003, India
*Corresponding author e-mail: ramshivnath@yahoo.com
Received: 15th April, 2015 Accepted: 25th February, 2016

**Abstract**
A field experiment was conducted during 2007-2011 on sandy loam soil at Jhansi, Uttar Pradesh to find out the effect of range legumes intercropping and weed management practices on weed control and fodder productivity of Guinea grass (*Panicum maximum*). Results indicated that intercropping of *Stylosanthes seabrana* with Guinea grass produced significantly higher total dry forage yield (6.68 t/ha) than *Clitoria ternatea* (5.41 t/ha) and *Macroptillium atropurpureum* (5.60 t/ha). In total dry forage yields, per cent contribution of *S. hamata, S. seabrana, Macroptillium atropurpureum* and *C. ternatea* were 30.52, 36.23, 23.39 and 20.15, respectively. In weed management practices, hand weeding 35 days after sowing in 1st year and 25 days after onset of monsoon rain from 2nd year onwards recorded significantly higher dry forage yields of both Guinea grass (5.02 t/ha) and legumes (2.00 t/ha) than weedy check, pre-emergence application of pendimethalin and weeding with weeder cum mulcher. Maximum net return (Rs 13733/ha) and net return per rupee invested (Re 1.48) were obtained by intercropping of Guinea grass with *S. seabrana*. Maximum net return (Rs 12746/ha) was also observed on hand weeding at 35 days after sowing. Intercropping of Guinea grass with *S. seabrana* and hand weeding showed maximum growth, productivity and monetary return from the system.

**Keywords:** Fodder yield, Guinea grass, Intercropping, Range legumes, Weed management

## Introduction

Guinea grass (*Panicum maximum* Jacq.) is one of the important pasture species suitable for higher forage production from community lands, village grazing lands and marginal lands owned by the farmers under semiarid rainfed condition. It is a high yielding perennial forage grass that performs well in 900 to 1500 mm rainfall range but can survive even when rainfall is less than 400 mm. It has profuse tillers, quick regeneration, high leaf-stem ratio, provides highly nutritious, digestible and palatable forage. It can be easily propagated both by seeds and vegetative means and performs well under shade of trees and saline sodic soil conditions. Intercropping of range legumes with grasses provide cheaper source of quality feed for enhancing animal productivity (Thomas *et al*., 1997; Meena *et al*., 2010). Legume also enriches the soil fertility and benefits the associated grasses (Datt *et al*., 2012). But lack of compatible legume components for intercropping with Guinea grass and their poor establishment and growth with grasses often leads to poor quality forage production. Also reseeding of legumes in such situation results in poor performance. One of the main reasons for poor establishment and growth of legumes is faster growth of weeds and their smothering effect during early stage of legumes growth. In forages, most of the areas are rainfed and dryland, under such situations; weeds compete with fodder species for space, soil moisture and nutrients and causes 30-40% losses in forage production (Reddy and Reddy, 2010). Presence of weeds in pasture field generally reduce the forage quality on account of low crude protein content and dry matter digestibility and high fibre content and also reduce quality of livestock products and affects animal health. In such situations weed management practices can provide best opportunity to legumes to establish and grow vigorously upto the time of harvest for quality forage production. In view of these points, the present investigation was under taken to identify suitable legumes for compatibility with Guinea grass and to study the effect of weed control on performance of legumes under semiarid rainfed conditions.

## Materials and Methods

The field experiment was conducted during 2007-2011 at Central Research Farm (25$^0$ 27' N latitude, 78$^0$ 37' E longitude and 275 m above mean sea level) of Indian Grassland and Fodder Research Institute, Jhansi. The soil of the experimental field was sandy loam, low in organic carbon (0.48) and available nitrogen-$NH_4^+$ and

$NO_3^-$ (217.5 kg/ha) and medium in available phosphorus-$H_2PO_4^-$ and $HPO_4^{2-}$ (10.45 kg/ha) and potash-$K^+$ (156.3 kg/ha). The total rainfall received was 553.8, 1267.1, 544.9 and 684.1 mm in 38, 52, 33 and 32 rainy days during 2007, 2008, 2009 and 2010, respectively. There were 16 treatment combinations replicated thrice in randomized block design. The treatment comprised with four range legumes *viz*., *Stylosanthes hamata, S. seabrana, Clitoria ternatea* and *Macroptillium atropurpureum* and four weed management practices *viz*., weedy check, hand weeding at 35 days after sowing in first year and 25 days after onset of monsoon rain from 2nd year onwards, weeding with weeder cum mulcher at 35 days after sowing in first year and 25 days after onset of monsoon rain from 2nd year onwards and pre-emergence application of pendimethalin @ 0.75 kg a.i/ha in first year and just after one day of onset of monsoon rain from 2nd year onwards. In perennial pasture it is recommended to apply pre-emergence herbicide before emergence of new tillers during monsoon season. The observations on number of weeds and weed dry weight were recorded at 60 days after sowing in first year and 50 days after onset of monsoon rain from 2nd year onwards. The transplanting of grass and sowing of legumes were done on 9th and 12th July 2007 respectively. Harvesting of pasture was done at 70 days after planting in first year and 60 days after onset of monsoon rain from 2nd year onwards. Guinea grass was transplanted at a distance of 1.0x0.5 m and legumes were sown in line between two rows of Guinea grass. The seed rate of *Stylosanthes hamata, S. seabrana, Clitoria ternatea* and *Macroptillium atropurpureum* used for intercropping with Guinea grass were 3, 5, 9 and 6 kg/ha, respectively. Dry matter content was estimated by drying 500 g plant sample of each treatment and replication in hot-air oven at 70$^0$C, which led to computation of dry matter yield. The crude protein content of the fresh samples was estimated by the procedure of AOAC (1995).

**Results and Discussion**

***Growth and productivity of Guinea grass*:** Intercropping of legumes did not affect significantly the growth parameters of Guinea grass (Table 1). However, among the legumes, *Macroptillium atropurpureum* significantly increased plant height as compared to *S. hamata, C. ternatea* and *S. seabrana.* While number of branches/ plant were increased significantly in *S. seabrana* (7.4, 9.5 and 8.9) than *Macroptillium atropurpureum*, *C. ternatea* and *S. hamata* during 2nd, 3rd and 4th years, respectively (Table 2). Mean data (Table 3 and 4) indicated that intercropping of *Stylosanthes seabrana* with Guinea grass produced significantly higher total green forage (25.10 t/ha) and dry forage yield (6.68 t/ha) than *Clitoria ternatea* (19.10 and 5.41 t/ha), *Macroptillium atropurpureum* (20.17 and 5.60 t/ha) and *S. hamata* (23.36 and 6.29 t/ha). This was due to better survival and growth of *S. seabrana* as compared to *S. hamata, Macroptillium atropurpureum* and *C. ternatea.* Intercropping of *Stylosanthes seabrana* with grasses were consistently superior to other *Stylosanthes species* in perennial plant density and yield (Edye *et al*., 1998; Pengelly and Conway, 2000). Basak *et al.* (2003) reported that *Stylosanthes seabrana* had the best overall yield performance out of twenty cultivars of *Stylosanthes* species which were evaluated for their growth and yield performance. Bhatt and Tiwari (2004) also reported that *Stylosanthes* species showed higher productivity over *M. atropurpureum*. In total dry forage yields, per cent contribution of *S. hamata, S. seabrana,* Siratro and *C. ternatea* were 30.52*,* 36.23*,* 23.39 and 20.15, respectively. Clem *et al*. (2001) observed that *S. seabrana* was best adapted for use in permanent pastures as compared to various other legumes.

Maximum net return (Rs 13733/ha) and net return per rupee invested (Re 1.48) were also obtained by intercropping of Guinea grass with *S. seabrana*. The higher net returns from *S. seabrana* intercropping with Guinea grass was attributed to higher forage yields. Crude protein yields (812.3, 587.0 and 538.7 kg/ha) were also increased significantly when guinea grass intercropped with *S. seabrana* than intercropping with *C. ternatea* (661.0, 453.1 and 357.7 kg/ha), *Macroptillium atropurpureum* (661.1, 455.9 and 389.1 kg/ha) and *S. hamata* (721.7, 518.8 and 439.9 kg/ha) during 2nd, 3rd and 4th years, respectively (Table 5). This was due to higher dry matter yield obtained by intercropping of *S. seabrana* with Guinea grass than *S. hamata, Macroptillium atropurpureum* and *C. ternatea*.

***Weed dynamics*:** Intercropping of *S. seabrana* with Guinea grass recorded significantly less number of weeds (40.53, 49.60 and 66.67/m$^2$) and lower weed dry weight (71.79, 87.38 and 107.98 g/m$^2$) as compared to *C. ternatea* (number of weeds 52.07, 66.93 and 83.97/ m$^2$ and weed dry weight 84.89, 107.61 and 130.84 g/m$^2$) during 2nd, 3rd and 4th years, respectively (Table 6). This was might be due to vigorous growth of *S. seabrana* which suppressed the growth of weeds. The effect of interaction between intercropping of legumes and weed management practices was found non-significant.

**Table 1.** Effect of legumes and weed management practices on growth parameters of Guinea grass

| Treatments | Height (cm) | | | | No. of tillers/ plant | | | |
|---|---|---|---|---|---|---|---|---|
| | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2007-08 | 2008-09 | 2009-10 | 2010-11 |
| ***Guinea grass + legumes*** | | | | | | | | |
| G + *S. hamata* | 124.5 | 170.2 | 140.5 | 148.7 | 20.3 | 32.9 | 25.5 | 27.4 |
| G + *S. seabrana* | 122.3 | 162.9 | 135.9 | 143.9 | 20.2 | 32.0 | 24.7 | 26.5 |
| G + *M. atropurpureum* | 119.7 | 160.1 | 134.2 | 142.1 | 19.0 | 31.2 | 24.3 | 26.0 |
| G + *C. ternatea* | 117.8 | 155.8 | 132.4 | 140.2 | 18.4 | 30.5 | 23.9 | 25.4 |
| CD (P≤0.05) | NS | NS | NS | NS | NS | NS | NS | NS |
| ***Weed management practices*** | | | | | | | | |
| Weedy check | 108.2 | 147.0 | 125.7 | 133.6 | 16.4 | 25.8 | 20.7 | 22.4 |
| Pendimethalin | 116.7 | 156.5 | 132.5 | 140.0 | 18.1 | 29.4 | 23.0 | 24.7 |
| Weeder cum mulcher | 124.7 | 164.0 | 137.1 | 145.6 | 20.2 | 32.6 | 25.2 | 27.0 |
| Hand weeding | 134.8 | 178.7 | 147.7 | 155.7 | 23.0 | 38.8 | 29.4 | 31.2 |
| CD (P≤0.05) | 7.6 | 14.8 | 11.5 | 9.7 | 1.9 | 3.1 | 2.3 | 2.7 |

| Treatments | Tussock diameter (cm) | | | | Leaf stem ratio | | | |
|---|---|---|---|---|---|---|---|---|
| | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2007-08 | 2008-09 | 2009-10 | 2010-11 |
| ***Guinea grass + legumes*** | | | | | | | | |
| G + *S. hamata* | 13.2 | 15.5 | 14.1 | 17.2 | 0.74 | 0.70 | 0.63 | 0.69 |
| G + *S. seabrana* | 12.9 | 15.0 | 13.7 | 16.7 | 0.74 | 0.69 | 0.62 | 0.67 |
| G + *M. atropurpureum* | 12.3 | 14.9 | 13.5 | 16.4 | 0.72 | 0.67 | 0.62 | 0.66 |
| G + *C. ternatea* | 12.1 | 14.4 | 13.3 | 16.0 | 0.70 | 0.67 | 0.61 | 0.66 |
| CD (P≤0.05) | NS | NS | NS | NS | NS | NS | NS | Ns |
| ***Weed management practices*** | | | | | | | | |
| Weedy check | 10.2 | 12.9 | 12.1 | 15.0 | 0.61 | 0.58 | 0.56 | 0.61 |
| Pendimethalin | 11.9 | 14.1 | 12.9 | 17.8 | 0.69 | 0.66 | 0.61 | 0.65 |
| Weeder cum mulcher | 13.1 | 15.1 | 13.7 | 16.8 | 0.76 | 0.71 | 0.64 | 0.67 |
| Hand weeding | 15.2 | 17.7 | 15.9 | 18.8 | 0.85 | 0.80 | 0.71 | 0.72 |
| CD (P≤0.05) | 1.2 | 1.4 | 1.2 | 1.5 | 0.05 | 0.04 | 0.03 | 0.04 |

G: Guinea grass

**Table 2.** Effect of Guinea grass and weed management practices on growth parameters of legumes

| Treatments | Height (cm) | | | | No. of branches/ plant | | | |
|---|---|---|---|---|---|---|---|---|
| | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2007-08 | 2008-09 | 2009-10 | 2010-11 |
| ***Guinea grass + legumes*** | | | | | | | | |
| G + *S. hamata* | 33.5 | 67.1 | 58.3 | 54.6 | 4.0 | 6.2 | 8.3 | 7.5 |
| G + *S. seabrana* | 36.2 | 103.1 | 97.5 | 104.3 | 3.2 | 7.4 | 9.5 | 8.9 |
| G + *M. atropurpureum* | 74.6 | 138.6 | 109.5 | 107.5 | 4.0 | 5.0 | 4.4 | 3.7 |
| G + *C. ternatea* | 38.6 | 70.8 | 82.9 | 68.5 | 2.4 | 5.4 | 5.8 | 6.3 |
| CD (P≤0.05) | 3.7 | 7.1 | 7.3 | 6.3 | 0.3 | 0.5 | 0.6 | 0.5 |
| ***Weed management practices*** | | | | | | | | |
| Weedy check | 37.3 | 80.7 | 76.1 | 74.3 | 2.3 | 4.6 | 5.6 | 5.6 |
| Pendimethalin | 43.3 | 89.7 | 83.3 | 80.5 | 3.4 | 5.5 | 6.5 | 6.2 |
| Weeder cum mulcher | 47.7 | 96.6 | 88.7 | 85.3 | 4.1 | 6.2 | 7.1 | 6.7 |
| Hand weeding | 54.7 | 112.6 | 100.1 | 94.9 | 5.0 | 7.8 | 8.7 | 7.9 |
| CD (P≤0.05) | 3.7 | 7.1 | 7.3 | 6.3 | 0.3 | 0.5 | 0.6 | 0.5 |

**Table 3.** Effect of legumes and weed management practices on green forage yield and economics of Guinea grass based pasture

| Treatments | Green forage yield (t/ha) | | | | | Net return (Rs/ha) | Net return per rupee invested (Rs) |
|---|---|---|---|---|---|---|---|
| | 2007-08 | 2008-09 | 2009-10 | 2010-11 | Mean | Mean | Mean |
| ***Guinea grass + legumes*** | | | | | | | |
| G + *S. hamata* | 18.99 (8.26) | 31.60 (9.42) | 21.13 (8.22) | 21.74 (9.00) | 23.36 (8.72) | 12109 | 1.28 |
| G + *S. seabrana* | 17.46 (6.92) | 34.28 (12.68) | 23.65 (11.12) | 25.01 (12.69) | 25.10 (10.85) | 13733 | 1.48 |
| G + *M. atropurpureum* | 16.32 (5.90) | 28.49 (7.25) | 18.20 (5.91) | 17.65 (5.54) | 20.17 (6.15) | 8967 | 0.97 |
| G + *C. ternatea* | 14.70 (4.38) | 27.56 (6.74) | 17.16 (5.06) | 15.97 (4.01) | 19.10 (5.05) | 7811 | 0.84 |
| CD (P≤0.05) | 1.26 (0.46) | 2.36 (0.57) | 1.60 (0.52) | 1.14 (0.41) | 1.41 (0.53) | - | - |
| ***Weed management practices*** | | | | | | | |
| Weedy check | 14.28 (5.17) | 25.71 (7.43) | 17.71 (6.68) | 18.01 (6.98) | 18.93 (6.57) | 9229 | 1.19 |
| Pendimethalin | 15.93 (5.90) | 28.53 (8.38) | 19.10 (7.17) | 19.17 (7.42) | 20.69 (7.22) | 10444 | 1.24 |
| Weeder cum mulcher | 17.45 (6.60) | 31.04 (9.23) | 20.20 (7.55) | 20.02 (7.75) | 22.18 (7.78) | 10201 | 0.99 |
| Hand weeding | 19.78 (7.78) | 36.65 (11.05) | 22.54 (8.30) | 23.16 (9.07) | 25.53 (9.05) | 12746 | 1.15 |
| CD (P≤0.05) | 1.26 (0.46) | 2.36 (0.57) | 1.60 (0.52) | 1.14 (0.41) | 1.41 (0.53) | - | - |

Values in parenthesis are green forage yield (t/ha) of legumes

**Table 4.** Effect of legumes and weed management practices on dry forage yield of Guinea grass based pasture

| Treatments | Dry forage yield (t/ha) | | | | |
|---|---|---|---|---|---|
| | 2007-08 | 2008-09 | 2009-10 | 2010-11 | Mean |
| ***Guinea grass + legumes*** | | | | | |
| G + *S. hamata* | 5.18(2.08) | 8.76 (2.16) | 5.97 (1.98) | 5.26 (1.50) | 6.29 (1.92) |
| G + *S. seabrana* | 4.67 (1.63) | 9.56 (2.98) | 6.56 (2.73) | 6.04 (2.46) | 6.68 (2.42) |
| G + *M. atropurpureum* | 4.19 (1.20) | 8.12 (1.62) | 5.34 (1.40) | 4.76 (1.03) | 5.60 (1.31) |
| G + *C. ternatea* | 3.89 (0.97) | 7.92 (1.49) | 5.23 (1.21) | 4.49 (0.69) | 5.41 (1.09) |
| CD (P≤0.05) | 0.35 (0.11) | 0.68 (0.12) | 0.48 (0.13) | 0.31 (0.08) | 0.42 (0.12) |
| ***Weed management practices*** | | | | | |
| Weedy check | 3.81 (1.21) | 7.31 (1.74) | 5.11 (1.61) | 4.56 (1.22) | 5.18 (1.43) |
| Pendimethalin | 4.18 (1.34) | 8.04 (1.93) | 5.48 (1.72) | 4.90 (1.33) | 5.66 (1.58) |
| Weeder cum mulcher | 4.63 (1.52) | 8.72 (2.10) | 5.85 (1.84) | 5.15 (1.41) | 6.11 (1.72) |
| Hand weeding | 5.33 (1.81) | 10.29 (2.48) | 6.68 (2.15) | 5.93 (1.72) | 7.02 (2.00) |
| CD (P≤0.05) | 0.35 (0.11) | 0.68 (0.12) | 0.48 (0.13) | 0.31 (0.08) | 0.42 (0.12) |

Values in parenthesis are dry forage yield (t/ha) of legumes

***Weed management*****:** Among weed management practices, hand weeding at 35 days after sowing in 1st year and 25 days after onset of monsoon rain from 2nd year onwards attributed to significantly higher growth parameters of both grass and legumes than all other methods of weed control (Table 1). Liu and Revell (2002) indicated that after removal of weeds, the legume component had the ability to grow better than weedy check. Hand weeding had significantly higher green forage yields of both Guinea grass (16.48 t/ha) and legumes (9.05 t/ha) than weedy check, pre-emergence application of pendimethalin and weeding with weeder cum mulcher (Table 3). The per cent increase in dry forage yields of pasture were 33.51, 23.04 and 14.35% in Guinea grass and 39.86, 26.58 and 16.28% in legumes by hand weeding than weedy check, pre-emergence application of pendimethalin and weeding with weeder cum mulcher. Hand weeding also recorded higher forage yield in maize-legume intercropping system (Chalka and Nepalia, 2005) and Berseem (Jha *et al.,* 2014).

Crude protein yields (493.5, 870.1, 591.7 and 508.1 kg/ha) were also increased significantly when hand weeding was done at 35 days after sowing in 1st year and 25 days after onset of monsoon rain from 2nd year onwards than weedy check, pre-emergence application of pendimethalin and weeding with weeder cum mulcher during 1st, 2nd, 3rd and 4th years, respectively. Moyer *et al.* (2003) also reported that removal of weeds resulted in higher protein yield than weed infested plots. Maximum net return (Rs 12746/ha) was also recorded in hand weeding. The higher net return from hand weeding was attributed to higher forage yields.

### *Performance of legumes with Guinea grass*

**Table 5.** Effect of legumes and weed management practices on crude protein yield of Guinea grass based pasture

| Treatments | Crude protein yield (kg/ha) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2007-08 | | | 2008-09 | | | 2009-10 | | | 2010-11 | | |
| | G | L | T | G | L | T | G | L | T | G | L | T |
| ***Guinea grass + legumes*** | | | | | | | | | | | | |
| G + *S. hamata* | 215.9 | 267.4 | 483.3 | 446.6 | 275.1 | 721.7 | 269.4 | 249.4 | 518.8 | 248.9 | 191.0 | 439.9 |
| G + *S. seabrana* | 210.3 | 204.8 | 415.1 | 447.0 | 365.3 | 812.3 | 258.9 | 328.1 | 587.0 | 239.8 | 298.9 | 538.7 |
| G + *M. atropurpureum* | 205.1 | 167.3 | 372.4 | 438.5 | 222.6 | 661.1 | 263.7 | 192.3 | 455.9 | 247.6 | 141.5 | 389.1 |
| G + *C. ternatea* | 200.0 | 151.8 | 351.8 | 430.7 | 230.3 | 661.0 | 268.3 | 184.8 | 453.1 | 250.8 | 106.9 | 357.7 |
| CD (P≤0.05) | NS | 15.8 | 32.5 | NS | 20.5 | 54.4 | NS | 17.6 | 39.6 | NS | 15.0 | 38.5 |
| ***Weed management practices*** | | | | | | | | | | | | |
| Weedy check | 175.9 | 160.4 | 336.3 | 368.2 | 227.5 | 595.7 | 231.5 | 207.5 | 439.0 | 219.5 | 157.1 | 376.6 |
| Pendimethalin | 194.2 | 179.5 | 373.7 | 408.9 | 254.5 | 663.4 | 250.9 | 223.8 | 474.7 | 236.4 | 172.5 | 408.9 |
| Weeder cum mulcher | 214.8 | 204.2 | 419.0 | 447.4 | 279.5 | 726.9 | 269.2 | 240.2 | 509.5 | 248.5 | 183.4 | 431.9 |
| Hand weeding | 246.3 | 247.2 | 493.5 | 438.3 | 331.8 | 870.1 | 308.7 | 283.0 | 591.7 | 282.8 | 225.3 | 508.1 |
| CD (P≤0.05) | 16.4 | 15.8 | 32.5 | 33.5 | 20.5 | 54.4 | 21.5 | 17.6 | 39.6 | 21.5 | 15.0 | 38.5 |

G: Grass, L: Legume, T: Total (Grass + legume)

**Table 6.** Effect of legumes and weed management practices on growth parameters of weeds in Guinea grass based pasture

| Treatments | 2007-08 | | 2008-09 | | 2009-10 | | 2010-11 | |
|---|---|---|---|---|---|---|---|---|
| | No. of weeds/ $m^2$ | Weed DW (g/ $m^2$) | No. of weeds/ $m^2$ | Weed DW (g/ $m^2$) | No. of weeds/ $m^2$ | Weed DW (g/ $m^2$) | No. of weeds/ $m^2$ | Weed DW (g/ $m^2$) |
| ***Guinea grass + legumes*** | | | | | | | | |
| G + *S. hamata* | 33.66 | 58.46 | 44.59 | 76.71 | 54.12 | 92.96 | 70.93 | 115.50 |
| G + *S. seabrana* | 35.91 | 62.63 | 40.53 | 71.79 | 49.60 | 87.38 | 66.67 | 107.98 |
| G + *M. atropurpureum* | 37.62 | 61.69 | 44.81 | 79.65 | 56.45 | 99.26 | 73.15 | 121.26 |
| G + *C. ternatea* | 38.98 | 62.08 | 52.07 | 84.89 | 66.93 | 107.61 | 83.97 | 130.84 |
| CD (P≤0.05) | NS | NS | 5.42 | 6.82 | 7.28 | 12.46 | 7.54 | 14.26 |
| ***Weed management practices*** | | | | | | | | |
| Weedy check | 50.88 | 84.83 | 61.57 | 106.77 | 74.14 | 127.26 | 91.35 | 151.86 |
| Pendimethalin | 43.54 | 70.79 | 51.84 | 90.63 | 63.53 | 109.54 | 80.93 | 133.54 |
| Weeder cum mulcher | 34.01 | 57.76 | 43.27 | 77.38 | 55.07 | 95.34 | 72.64 | 117.98 |
| Hand weeding | 17.76 | 31.47 | 25.31 | 39.52 | 34.35 | 55.09 | 49.80 | 72.16 |
| CD (P≤0.05) | 5.62 | 6.28 | 5.42 | 6.82 | 7.28 | 12.46 | 7.54 | 14.26 |

DW: Dry weight

Hand weeding also resulted in significantly less number of weeds (17.76, 25.31, 34.35 and 49.80/$m^2$) and lower weed dry weight (31.47, 39.52, 55.09 and 72.16 g/$m^2$) than weedy check, pre-emergence application of pendimethalin and weeding with weeder cum mulcher at 60 days after sowing in first year and 50 days after onset of monsoon rain from 2nd year onwards. Decrease in weed count and weed dry weight under hand weeding were also reported by Sharma and Gill (2005). The common weeds found and removed from the experimental field were *Cynotis sp., Commelina benghalensis, Leucas aspera, Cassia tora, Phyllanthus niruri, Borreria hispida, Fimbristylis diphylla, Parthenium hysterophorus, Celosia argentea, Ipomea pestigridis, Digera arvensis, Tridax procumbence, Sida acuta, Cyperus rotundus, Coculus sp., Miremia emarginata, Miremia triandra* and *Borreria stricta*. The effect of interaction between weed management practices and intercropping of legumes was found non-significant.

**Conclusion**

Intercropping of Guinea grass with *S. seabrana* along with hand weeding at 35 days after sowing in first year and 25 days after onset of monsoon rain from 2nd year

onwards was found most productive and effective method of weed control in sandy loam soils of semi-arid region under rainfed conditions.

**Acknowledgement**

We gratefully acknowledge the support, encouragement and facilities provided by Director, Indian Grassland and Fodder Research Institute, Jhansi for carrying out the experiments.

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