Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

**E-ISSN:** 2278-4136
**P-ISSN:** 2349-8234
JPP 2018; SP1: 3302-3305

**J Nambi**
Assistant professor
Department of Agronomy
Faculty of Agriculture,
Annamalai University,
Chidambaram, Tamil Nadu,
India.

**Correspondence**
**J Nambi**
Assistant professor
Department of Agronomy
Faculty of Agriculture,
Annamalai University,
Chidambaram, Tamil Nadu,
India.

# Productivity and economics of crop establishment methods and weed management practices on irrigated redgram

## J Nambi

**Abstract**
A field experiment was conducted at Experimental farm, Faculty of Agriculture, Annamalai University, Annamalai Nagar during *kharif* 2013 with an objective to study the effect of weed management practices and crop establishment methods in irrigated redgram. The experiment was laid out in split plot design with three replications. The treatment comprised of two crop establishment methods viz., transplanting and direct sown, were assigned to main plot and in sub plot treatments consist of pre-emergence application of herbicides alachlor and pendimethalin 1.0kg $ha^{-1}$ each in combination with one hand weeding on 40 DAS and pre emergence application of alachlor and pendimethalin with post-emergence herbicide Imazethapyr1.0kg $ha^{-1}$on 25 DAS. In addition to this two hand weedingon 20 and 40 DAS and un weeded control. The obtained results revealed that among the weed management practices pre-emergence application of pendimethalin 1.0kg $ha^{-1}$ followed by hand weeding on 40 DAS effectively controlled the weed density, dry weight and higher weed control efficiency that favourably increased the yield attributes and yield of redgram. Transplanted redgram increased the he yield attributes of redgramviz., total number of pods $plant^{-1}$, number of seeds $plant^{-1}$ and seed yield than direct sown method.

**Keywords:** Ttransplantingredgram, weed control, seed yield, economics

## Introduction
India ranks first and contributes about 25%. To the total pulse basket During 1991-2007, area under pulses ranged between 20.35 and 24.66 million hectares in terms of both area and production, while production and productivity ranged from 11.15 to 15.11 million tonnes and 533 to 635 kg $ha^{-1}$.The productivity of pulses however, continues low yield (Ramjit Kaur *et al.*, 2015). The number of factor responsible for the low yield in redgram is mostly grown as rainfed in dry land areas, receives low inputs of fertilizer, water and pesticides, poor quality seeds and lack of advanced management practices which do not receive good yield. Among different agronomic practices limiting the yield, choice of a suitable method of establishment is one of the important factors in production of redgram. Adoption of proper method of crop establishment will decide the plant population and in making efficient use of limited growth resources and thus to stabilize the yield (Anonymons, 2014) [1]. Transplanting of redgram is one of the method of establishment to get healthy and optimum plant population in the main field and ables to utilize the soil moisture and nutrients and develop vigoursly immediately on onset of monsoon Redgram faces heavy weed infestation in the early stages of crop growth, because of its slow growth habit in the initial stages coupled with wider spacing. leads to severe crop weed competition which finally reduces the crop yield (Channappagoudar and Biradar, 2007). Number of herbicides now available is capable of controlling many weeds very effectively. However, in tropical countries as ours a wide spectrum of weed flora is observed. Higher rate of herbicides may leave residue to succeeding crops. Further the continuous use of herbicides may eliminate all the susceptible weed species and their place may be taken over by some resistance ones, or the existing ones may develop resistance. Use of herbicides in conjunction with manual practices would make the herbicidal control more acceptable to farmers and allow complete control of weeds. The aim of the study was to determine the effect of weed management in different crop establishment method.

## Materials and Method
Afield experiment was conducted during *kharif* 2014 at Experimental Farm Annamalai university under irrigated condition The experimental farm is located at $11^{0}24'$N latitude and $79^{0}44'$E longitude with an attitude of 5.79m above mean sea level. The soil of the

experimental site was low in available N, medium in available P and high in available K. The crop was fertilized with recommended fertilizer dose of 25 kg N, 50 kg $P_2O_5$, 25 kg$K_2O$ $ha^{-1}$ were applied through urea, SSP and MOP. In transplanting method, soil media was preparation by mixing soil, sand and farmyard manure in the 1:1:1: ratio and polythene bag was filled with this media. Two three holes per bag made to drain excess water. Seeds were dibbled in polythene bag. After the emergence of seeds only one healthy seedling was retained per polythenebag. Proper watering was taken to maintain the moister level. At the age of 21 days seedlings were transplanted after irrigation in the experimental field.

The experiment was laid out in split plot design with three replications comprised two crop establishment methods in main plot and weed management practices in sub plot The treatment comprised of two crop establishment methods viz., transplanting and direct sown, were assigned to main plot and in sub plot treatments consist of pre-emergence application of herbicides alachlor and pendimethalin 1.0kg $ha^{-1}$ each in combination with one hand weeding on 40 DAS and pre emergence application of alachlor and pendimethalin with post-emergence herbicide Imazethapyr 1.0kg $ha^{-1}$ on 25 DAS. in addition this two hand weeding on 20 and 40 DAS and unweeded control. Redgram variety Co (Rg) 7 was used as the test variety during *kharif* season for the study Redgram seeds were sown 60 cm between rows and 30 cm between seed to seed with plot size of 6 X 3 m, Weed density was taken at 15, 30, 45 and 60 DAS. Pre dominant weed species were observed and grouped as grasses, sedges and broad leaved weeds. Quadrat ($0.25m^2$) was placed at four randomly selected places in each plot and the number of weed species were recorded and expressed as number of weed $m^{-1}$.Weeds found in quadrat were removed, sundried and then oven dried at at 70 $^0$C for 72 hours. till constant weight obtained. The dry weight was recorded and expressed in kg $ha^{-1}$.Weed control efficiency was computed by adopting the formula suggested by Mani *et al.* (1973) [4]

$$WCE \quad (\%) \quad = \quad \frac{Wpc \quad - \quad Wpt}{Wpc} \quad x \quad 100$$

Where,
Wpc = Weed population in the control plot
Wpt = Weed population in the treated plot

**Result and Discussion**

Weed flora of the experimental filed consists of five species of grasses, ten species of broad leaved weeds and a species of Sedges. Among the weed flora, *EchinocholaColonum, Echinocholacrusgalli, Leptochlolachinesis* and *Panicumflavidum* was dominant among grasses. With respect to broad leaved weeds *Moschosmapolystachym, Physalis minima, Trianthemaportulacastrum* and *Cleome viscosa* were found higher in population *Cyperusrotundus* was the only sedge present.

Weed management practices significantly influenced the weed density at all stages. Herbicide applied treatments recorded lower weed density at 15, 30, 45 and 60 DAS than hand weeding and unweeded control. The lowest weed density of was observed with pre emergence application of pendimethalin followed by hand weeding on 40 DAS and it was followed by pre emergence application pendimethalin followed by post emergence application Imazethapyr. The reduction in grass, sedges, broad leaved weeds and total weed density were observed with pre emergence application of pendimethalin followed by hand weeding on 40 DAS. This might due to weeds controlled by inhibition of microtubule formation, which essential for mitotic cell division (Strachan and Hessel 1983) [7] and shoot is drastically affected and growth suppressed. Similar reports are reported Mohammed Azimkhan (2011) [5] Pendimethalin being comparatively more persistent with a half life period of 11 days and persistence up 25 days might have delivered the weed control effect on germinating weeds over a prolonged period over prolonged period by exhausting the seed reserves in the soil. There by herbicide was able to act better on the germinated weeds and weed seed. (Zimdah *et al.* 1984).

**Table 1:** Totalweed density as influenced by crop establishment method and weed management practices (No.$m^{-2}$)

| Treatments | 15 DAS | 30 DAS | 45 DAS | 60 DAS |
|---|---|---|---|---|
| **Crop establishment** | | | | |
| $M_1$ -Direct Sowing | 51.76(7,22) | 53.04(7.31) | 56.65(7.55) | 74.56(8.66) |
| $M_2$- Transplanting | 52.35(7.24) | 51.26(7.19) | 54.63(7.42) | 66.54(8.18) |
| SE.d | 0.5 | 0.11 | 0.08 | 0.12 |
| CD(p=0.05 | NS | NS | NS | 0.26 |
| **Weed Control Methods** | | | | |
| $S_1$- Untreated control | 113.51(10.67) | 161.67(12.73) | 181.08(13.47) | 217.25(14.75) |
| $S_2$-Twice HWon 20 & 40 DAS | 110.06(10.51) | 35.36(5.94) | 17.55(4.24) | 44.60(6.71) |
| $S_3$ - PEAlachlor+ hand weeding on 40DAS | 21.43(4.68) | 30.23(5.54) | 35.54(6.00) | 42.48(6.55) |
| $S_4$ - PEAlachlor+ POE Imazethapyr | 23.78(4.92) | 32.27(5.72) | 37.18(6.13) | 45.63(6.79) |
| $S_5$ -PEPendimethalin + HW on 40 DAS | 19.59(4.45) | 24.71(5.02) | 30.09(5.53) | 34.35(5.90) |
| $S_6$- PEPendimethalin+POEImazethapyr | 24.85(5.03) | 28.66(5.40) | 32.41(5.78) | 38.36(6.23) |
| SE.d | 0.09 | 0.18 | 0.10 | 0.13 |
| CD(p=0.05 | 0.20 | 0.35 | 0.21 | 0.28 |

*Figures in the paranthesisare square root transformed [SQR (X+0.5)] values.*PE- Pre-emergence, POE – Post emergence, HW – Hand weeding, DAS – Days after sowing

**Weed Dry Matter Production**

Crop establishment techniques exerted significant variation at 60 DAS. Transplanted redgram registered significantly lesser weed DMP as compared to direct sown method, among the weed management practices, pre-emergence application of pendimethalin followed by hand weeding on 40 DAS significantly lowered the weed DMP and the highest weed DMP wasregistered in unweeded control. The lowest weed dry weight per unit area in the plot that received from treated plot was due to the less number of weeds by control of weeds in early stage of crop further weed growth by effective controlled by hand weeding. Similar observations are observed by Talnikar *et al.* (2008) [8].

**Table 2:** Weed dry matter production (kg ha$^{-1}$) as influenced by crop establishment method and weed management practices

| Treatments | 15 DAS | 30 DAS | 45 DAS | 60 DAS |
|---|---|---|---|---|
| **Crop establishment** | | | | |
| $M_1$ -Direct Sowing | 30.50(5.56) | 34.46(5.91) | 37.44(6.15) | 52.61(7.28) |
| $M_2$- Transplanting | 31.69(5.67) | 33.40(5.82) | 37.55(6.16) | 50.38(7.13) |
| SE.d | 0.11 | 0.10 | 0.11 | 0.14 |
| CD(p=0.05) | NS | NS | NS | NS |
| **Weed Control Methods** | | | | |
| $S_1$- Untreated control | 77.53(8.83) | 115.76(10.78) | 121.65(11.05) | 161.43(12.72) |
| $S_2$-Twice HWon 20 & 40 DAS | 67.15(8.22) | 20.71(4.60) | 14.75(3.90) | 31.81(5.68) |
| $S_3$ - PEAlachlor+ hand weeding on 40DAS | 11.41(3.45) | 18.28(4.33) | 23.50(4.89) | 29.54(5.48) |
| $S_4$ - PEAlachlor+ POE Imazethapyr | 13.48(3.73) | 18.59(4.36) | 24.57(5.00) | 31.92(5.69) |
| $S_5$ -PEPendimethalin + HW on 40 DAS | 10.68(3.34) | 14.28(3.84) | 19.08(4.42) | 25.90(5.13) |
| $S_6$- PE Pendimethalin+POEImazethapyr | 11.89(3.51) | 10.80(3.36) | 21.42(4.68) | 28.36(5.37) |
| SE.d | 0.08 | 0.20 | 0.12 | 0.10 |
| CD(p=0.05 | 0.16 | 0.41 | 0.25 | 0.21 |

*Figures in the paranthesisare square root transformed [SQR (X+0.5)] values.*PE- Pre-emergence, POE – Post emergence, HW – Hand weeding, DAS – Days after sowing

**Weed control efficiency**

Weed control efficiency indicates the magnitude of effective reduction of weed density by weed management practices. Pre-emergence application of pendimethalin followed by hand weeding on 40 DAS recorded higher WCE of 84.72, 83.38, 84.23 on 30, 45 and 60 DAS. More reducing in weed density and dry weight resulted in higher WCE. Pendimethalin a selective herbicide, it controlled the emerging weeds very effectively and subsequently reduced the weed density. These results corroborate the finds of Babulalmeena *et al.*, (2010).

**Table 3:** Weed control efficiency and weed index as influenced by crop establishment methods and weed management practices

| Treatments | Weed control efficiency | | |
|---|---|---|---|
| Cropping system | 30 DAS | 40 DAS | 60 DAS |
| $M_1$ – Direct sowing | 67.74 | 68.96 | 67.40 |
| $M_2$ – Transplanting | 68.07 | 69.57 | 67.77 |
| Weeg management Practices | | | |
| $S_1$- Untreated control | — | — | — |
| $S_2$-Twice HWon 20 & 40 DAS | 79.12 | 90.30 | 79.46 |
| $S_3$ - PEAlachlor+ hand weeding on 40DAS | 81.30 | 80.36 | 80.45 |
| $S_4$ - PEAlachlor+ POE Imazethapyr | 80.04 | 79.46 | 78.94 |
| $S_5$ -PEPendimethalin + HW on 40 DAS | 84.72 | 83.38 | 84.23 |
| $S_6$- PE Pendimethalin+POEImazethapyr | 83.77 | 82.01 | 82.38 |

**Table 4:** Yield parameters and yield of redgram as influenced by crop establishment methods and weed control practices

| Treatments | Seed yield (kg ha$^{-1}$ ) | Cost of Cultivation (Rs ha$^{-1}$) | Gross Income (Rs ha$^{-1}$) | Net Income (Rs ha$^{-1}$) | Benefit Cost Ratio |
|---|---|---|---|---|---|
| $M_1S_1$ | 405 | 21340 | 24730 | 3390 | 1.15 |
| $M_1S_2$ | 909 | 23788 | 55735 | 31947 | 2.34 |
| $M_1S_3$ | 940 | 23258 | 57690 | 34432 | 2.48 |
| $M_1S_4$ | 916 | 22952 | 56171 | 33219 | 2.44 |
| $M_1S_5$ | 1097 | 22595 | 67260 | 44664 | 2.97 |
| $M_1S_6$ | 1018 | 22289 | 62364 | 40074 | 2.79 |
| $M_2S_1$ | 586 | 22120 | 35788 | 13667 | 1.61 |
| $M_2S_2$ | 1114 | 24568 | 68248 | 43679 | 2.77 |
| $M_2S_3$ | 1219 | 24038 | 74639 | 50601 | 3.10 |
| $M_2S_4$ | 1157 | 23732 | 70863 | 47130 | 2.98 |
| $M_2S_5$ | 1380 | 23375 | 84554 | 52689 | 3.61 |
| $M_2S_6$ | 1298 | 23069 | 79512 | 56442 | 3.44 |

| | SEd | CD(p=0.05) |
|---|---|---|
| M | 12.295 | 45.955 |
| S | 16.563 | 33.625 |
| M × S | 36.101 | 77.390 |
| S × M | 35.126 | 76.530 |

**Yield parameter and Seed yield**

Transplanted redgram found significantly highest seed yield than direct sown redgram. Among weed management practices, application of pre-emergence application of pendimentation 1.0 kg ha$^{-1}$followed by hand weeding on 40 DAS recorded more seed yield. The quantity of seed produced per hectare was comparatively higher in transplanted redgram than direct sown redgram. This might due to advanced sowing of redgram that enhance deep rooting and promotes soil biotic activities in and around plant roots. Transplanting redgram allowed enough sunlight to reach leaves of redgram resulted in spread of roots there by more uptake of nutrients leads to profuse branching and healthy plants resulted in increased yield. The result confirm the findings of Anilkumar *et al.*, (2012). Pre-emergence applications of pendimentation 1.0 kg ha$^{-1}$ followed by hand weeding. On 40 DAS significantly increased the seed yield of 1238.50 kg ha$^{-1}$in different weed control methods. The yield components recorded under this

treatment might be due decreased weed competition and minimum nutrient removal br weeds provided a completion free environment for the crop the lowest yield was recorded with direct sown redgram with unweeded control. The weed management treatments resulted in higher gross, net return and B:C ratio than unweeded control. Application of pre-emergence application of pendimethalin 1.0 kg $ha^{-1}$ followed by hand weeding on40 DAS under any crop establishment techniques recorded more gross income, net return and B:C ratio Among the crop establishment techniques, the highest net income was registered by transplanted redgram. Higher gross income and net was recorded by transplanted redgram with pre-emergence application of pendimethalin 1.0 kg followed by hand weeding and 40 DAS.

Based on the study it is concluded that redgram should be planted in transplanted method along with pre emergence application of pendimethalin followed by hand weeding on 40 DAS for greater weed control, productivity and profitability.

**References**


1. Anonymous. Package of practices for kharif crops of Punjab. Punjab Agriculture University, Ludhana, India, 2014.
2. Channappagaundar BB, Biradar NR. Physiological Approaches for weed management in soybean and Redgram [4:2rp] Intercropping system. Karnataka J Agric. Sci. 2007; 20(27):241-244.
3. FAOSTAT, http://faostat.Fao.org, 2012.
4. Mani VS, Mala ML, Gautam KC, Bhagavandas. Weed killing chemicals in potato cultivation. Indian Farming 1973; 23(1):17-18.
5. Mohammed Azimkhan, Anwar Nawazkhan, Rahamdadkhan, Umm-E-Kalsom. Weed control efficiency of intercropping legumes in Mathe Pak. J Weed Sci. Res. 2011; 17(4):303-312.
6. Priyanka K, Suresh Patil S, Hiremath GM, Amrutha Joshi T, Sunil Kalkarani A. *Comparatively analysis of transplanted and dibble method red gram allswatrin in Bider district of Karnataka,* Karnataka, J (Agri Sci. 2013; 2612:238-241).
7. Strachan SD, Hess FD. The bio-Chemical mechanism of active of the dinitroanline herbicide oryzalin: pesticbiochem. Physolt 20:41-50 Vaughan, K.C. Marks, M.D. and D.P.Weeds-1987. A divimoaniline resistant nutrient of Elusine India exhibites cross resistant and supersentivity to anti microtubule herbicide and dry: plant phy soil. 1983; 83:956-964.
8. Talnikar AS, Kadam GL, Karande DR, Jogdand PB. Integrated weed management in pigeonpea (CajanusCajan [2] mill S.P.]. int. J Agric. Sci. 2008; 4:363-370.