

## **Efficacy of Pendimethalin Under Different Planting Methods of Blackgram (*Vigna mungo*)**

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### **ABSTRACT**

Pendimethalin at 1.50 kg ha<sup>-1</sup> in combination with raised seed bed planting was found effective in controlling the weeds and increasing the seed yield of blackgram. Seed yield loss of 29% was recorded in raised bed planting-unweeded check combination.

### **INTRODUCTION**

Blackgram is an important crop among **kharif** pulses and is usually grown in marginal and sub-marginal lands without weed management. Presently not only the productivity and production are diminishing but area is also squeezing under this crop. Among various barriers like hungry and discarded soils, lack of promising cultivars, improper fertilization, pest and diseases, poor weed management is one of the most important yield limiting factors. Weeds reduce yield of blackgram to the extent of 78% (Gogoi *et al.*, 1992) and sometimes lead to a total failure of crop. Mechanical/manual weeding is normally tedious, labour consuming and costlier. Integrated weed management, which includes manual weeding, herbicides and different planting methods, can prove more economical and beneficial. Under high rainfall situation water stagnation usually causes yellowing and higher weed competition thereby reducing the yield of the blackgram. Conventionally the crop is sown under flat field conditions. Under present investigation, efforts were made to explore the feasibility of growing blackgram on ridges and raised beds by keeping almost the recommended spacing. Therefore, the present investigation was undertaken to find out the efficacy of pendimethalin on conventional, raised bed and ridge system of blackgram planting.

### **MATERIALS AND METHODS**

A field experiment was conducted at the experimental farm of Department of Agronomy, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur during **kharif** 2002 and 2003. The experiment was laid out in randomized block design with three replications and nine treatment combinations. The treatment combinations consisted of three planting techniques (ridge, raised bed and conventional) and three weed control methods (unweeded, pendimethalin at 1.50 kg ha<sup>-1</sup> and 0.75 kg ha<sup>-1</sup>). Ridges of 15 cm height were raised at 30 cm spacing and beds of 60 cm breadth and 15 cm height were raised in raised bed planting. The soil of the experimental site was silty clay loam in texture, acidic in reaction (pH 5.9), low in nitrogen and phosphorus and medium in potassium status. Blackgram variety PDU-1 was sown during first week of July during both the seasons of investigation. Recommended package of practices, except weed control treatments was adopted to grow the experimental crop. Pendimethalin was applied with foot sprayer fitted with flat fan nozzle using 700 l water ha<sup>-1</sup> as pre-emergence.

### **RESULTS AND DISCUSSION**

#### **Effect on Weeds**

Weeds observed in the experimental field were *Echinochloa colona*, *Cyperus iria*, *Digitaria*

Table 1. Effect of treatments on weeds (No. m<sup>-2</sup>) in urdbean

| Treatment                  | Dose<br>(kg ha <sup>-1</sup> ) | E.<br><i>colona</i> |              | C.<br><i>iria</i> |              | D.<br><i>sanguinalis</i> |              | P.<br><i>dichotomiflorum</i> |              | P.<br><i>alatum</i> |              | A.<br><i>conyzoides</i> |                |
|----------------------------|--------------------------------|---------------------|--------------|-------------------|--------------|--------------------------|--------------|------------------------------|--------------|---------------------|--------------|-------------------------|----------------|
|                            |                                | 2002                | 2003         | 2002              | 2003         | 2002                     | 2003         | 2002                         | 2003         | 2002                | 2003         | 2002                    | 2003           |
|                            |                                | Ridge-Unweeded      | -            | 8.97<br>(80)      | 6.00<br>(36) | 10.07<br>(101)           | 7.89<br>(61) | 11.35<br>(128)               | 2.33<br>(5)  | 3.35<br>(21)        | 5.97<br>(35) | 5.20<br>(27)            | 6.20<br>(43)   |
| Ridge-Pendimethalin        | 1.5                            | 2.04<br>(5)         | 1.67<br>(3)  | 8.06<br>(64)      | 3.60<br>(12) | 3.62<br>(16)             | 1.0<br>(0)   | 1.00<br>(0)                  | 1.67<br>(13) | 3.08<br>(11)        | 4.19<br>(31) | 23.83<br>(571)          | 25.81<br>(665) |
| Ridge-Pendimethalin        | 0.75                           | 2.04<br>(5)         | 2.74<br>(7)  | 8.05<br>(64)      | 5.73<br>(32) | 1.00<br>(0)              | 1.00<br>(0)  | 3.67<br>(16)                 | 3.78<br>(13) | 1.00<br>(0)         | 5.61<br>(33) | 26.10<br>(693)          | 25.21<br>(634) |
| Raised-Unweeded            | -                              | 6.29<br>(42)        | 4.82<br>(23) | 9.43<br>(88)      | 8.06<br>(64) | 8.70<br>(75)             | 2.08<br>(4)  | 10.75<br>(115)               | 6.18<br>(37) | 6.58<br>(43)        | 5.96<br>(35) | 18.99<br>(360)          | 21.59<br>(468) |
| Raised-Pendimethalin       | 1.50                           | 1.00<br>(0)         | 2.33<br>(5)  | 5.74<br>(32)      | 4.57<br>(20) | 1.00<br>(0)              | 1.41<br>(1)  | 2.04<br>(5)                  | 3.00<br>(8)  | 1.00<br>(0)         | 4.10<br>(16) | 25.37<br>(643)          | 25.79<br>(664) |
| Raised-Pendimethalin       | 0.75                           | 2.58<br>(11)        | 3.20<br>(9)  | 8.62<br>(75)      | 6.12<br>(37) | 3.62<br>(16)             | 1.67<br>(2)  | 1.00<br>(0)                  | 3.95<br>(15) | 1.41<br>(1)         | 5.25<br>(27) | 26.95<br>(725)          | 25.77<br>(663) |
| Conventional-Unweeded      | -                              | 9.25<br>(91)        | 5.71<br>(32) | 8.30<br>(69)      | 7.63<br>(57) | 12.46<br>(155)           | 2.33<br>(5)  | 4.15<br>(43)                 | 8.45<br>(41) | 6.74<br>(45)        | 7.07<br>(49) | 19.54<br>(381)          | 21.37<br>(456) |
| Conventional-Pendimethalin | 1.50                           | 3.35<br>(21)        | 3.20<br>(9)  | 7.00<br>(48)      | 5.24<br>(27) | 7.00<br>(48)             | 1.67<br>(3)  | 1.00<br>(0)                  | 3.75<br>(13) | 2.58<br>(11)        | 4.40<br>(19) | 30.02<br>(906)          | 25.55<br>(652) |
| Conventional-Pendimethalin | 0.75                           | 9.28<br>(128)       | 3.58<br>(12) | 7.29<br>(53)      | 5.62<br>(3)  | 8.02<br>(64)             | 1.67<br>(3)  | 1.00<br>(0)                  | 4.10<br>(16) | 5.47<br>(29)        | 5.96<br>(35) | 24.24<br>(688)          | 24.14<br>(582) |
| LSD ( P = 0.05)            |                                | 6.31                | 1.35         | 1.71              | 0.64         | 2.18                     | NS           | 4.68                         | 0.86         | 2.17                | 0.98         | 3.29                    | 1.51           |

Figures in parentheses are the averaged original values.

*sanguinalis*, *Panicum dichotomiflorum*, *Commelina benghalensis*, *Polygonum alatum* and *Ageratum conyzoides*. In general, *D. sanguinalis*, *P. dichotomiflorum*, *C. iria* and *E. colona* were dominant weed species but the effective control of these weeds by herbicide provided enough free space for *A. conyzoides* and *P. alatum* to become predominant weeds at the harvest stage of crop. Ridge planting in combination with pendimethalin at 1.50 kg ha<sup>-1</sup> and at 0.75 kg ha<sup>-1</sup> being at par with raised bed planting at 0.75 kg ha<sup>-1</sup> was effective to reduce the population of *E. colona* significantly over other treatments (Table 1). However, these treatments remained at par with pendimethalin at 1.50 kg ha<sup>-1</sup> in conventionally planted blackgram. Pendimethalin at 1.50 kg ha<sup>-1</sup> in combination with raised seed bed and ridge planting was effective to control *D. sanguinalis* than other weed control treatments.

Pendimethalin at 1.50 kg ha<sup>-1</sup> in combination with raised seed bed was alike with pendimethalin at 1.50 and 0.75 kg ha<sup>-1</sup> in combination with conventional planting with respect to population of *C. iria*. Pendimethalin at 1.50 kg ha<sup>-1</sup> in combination with raised seed bed and ridge planting was effective to control *P. dichotomiflorum* and *P. alatum* as compared to other treatments. However, population of *A. conyzoides* which appeared at later stages of

crop growth was not effectively controlled by the herbicide and significantly lower population was recorded in unweeded plots in all the three planting methods. Pendimethalin in all the planting methods recorded significantly higher population of *A. conyzoides*. This is attributed to the fact that enough weed-free space was provided by these treatments for the emergence of *A. conyzoides* which appeared after 45 days of sowing.

Total weed count at harvest was not significantly influenced by weed control treatments during 2002; however, during 2003, significantly lowest population was recorded in unweeded plots, whereas herbicide treated plots recorded higher population.

#### Effect on Crop

All the treatments significantly reduced the dry weight of weeds as compared to unweeded check (Table 2). Raised and ridge planting in combination with both the doses of pendimethalin being statistically at par recorded significantly lower total dry matter of weeds as compared to other combinations.

Pendimethalin at 1.50 kg ha<sup>-1</sup> in combination with raised bed recorded significantly higher seed

Table 2. Effect of treatments on total weed count, dry matter accumulation by weeds and seed yield of blackgram

| Treatment                  | Dose<br>(kg ha <sup>-1</sup> ) | Total weed count<br>(No. m <sup>-2</sup> ) |             | Dry matter of weeds<br>(g m <sup>-2</sup> ) |             | Seed yield<br>(kg ha <sup>-1</sup> ) |        |
|----------------------------|--------------------------------|--|-------------|---|-------------|--------------------------------------|--------|
|                            |                                | 2002                                       | 2003        | 2002  | 2003        | 2002                                 | 2003   |
| Ridge-Unweeded             | -                              | 26.27 (807)                                | 25.72 (661) | 26.82 (721)                                 | 17.5 (300)  | 315                                  | 633    |
| Ridge-Pendimethalin        | 1.50                           | 26.62 (709)                                | 27.70 (767) | 24.42 (597)                                 | 13.87 (192) | 436                                  | 916    |
| Ridge-Pendimethalin        | 0.75                           | 28.36 (813)                                | 26.32 (692) | 22.78 (519)                                 | 13.95 (193) | 407                                  | 883    |
| Raised-Unweeded            | -                              | 30.80 (967)                                | 25.41 (647) | 25.07 (628)                                 | 18.62 (346) | 352                                  | 750    |
| Raised-Pendimethalin       | 1.50                           | 27.10 (733)                                | 27.27 (743) | 24.26 (589)                                 | 12.01 (143) | 561                                  | 950    |
| Raised-Pendimethalin       | 0.75                           | 29.90 (893)                                | 27.63 (763) | 24.35 (592)                                 | 12.38 (152) | 554                                  | 826    |
| Conventional-Unweeded      | -                              | 29.25 (859)                                | 25.79 (665) | 26.91 (723)                                 | 8.34 (336)  | 366                                  | 583    |
| Conventional-Pendimethalin | 1.50                           | 34.06 (1171)                               | 27.14 (736) | 26.49 (703)                                 | 13.22 (174) | 463                                  | 866    |
| Conventional-Pendimethalin | 0.75                           | 31.98 (1027)                               | 26.38 (695) | 26.36 (695)                                 | 13.75 (188) | 509                                  | 833    |
| LSD (P=0.05)               |                                | NS   | 1.44        | 1.91  | 1.01        | 80.52                                | 204.67 |

Figures in parentheses are the averaged original values pre-emergence.

NS-Not Significant.

yield of blackgram. Unweeded plots in raised bed planting reduced the seed yield by 29.0% as compared to pendimethalin at 1.50 kg ha<sup>-1</sup>. However, during 2002 this treatment remained statistically at par with pendimethalin at 0.75 kg ha<sup>-1</sup> in combination with raised seedbed and conventional planting and during 2003 with all treatments except unweeded plots in three planting methods. Significantly lower seed yield was recorded in unweeded plots in combination with conventional planting.

For effective control of weeds and obtaining higher yield of blackgram, crop should be planted on ridges and raised beds and weeds should be managed with pre-emergence application of pendimethalin.

#### REFERENCE

- Gogoi, A. K., H. Kalita, A. K. Pathal and J. Deka, 1982. Crop-weed competition in rainfed blackgram. *Indian J. Weed Sci.* 21: 81-83.