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# Influenced by herbicidal weed control methods in yield of blackgram mustard cropping system

**Rajnish Anand and Dr. Phool Chandra Singh**

**Abstract**
The experiment was conducted at Sri Durga Ji Post Graduate college, Chandeshwar, Azamgarh, ( U.P.) during rainy and winter seasons of 2019-20 and 2020-21.To study the Influenced by Herbicidal weed control methods in yield of blackgram mustard cropping system The experiment was laid out in a RBD with 16 treatments i.e. Imazethapyr 50 g/ha PRE (T1), Imazethapyr 70 g/ha PRE (T2), Imazethapyr 80 g/ha PRE (T3), Imazethapyr 50 g/ha POE (T4), Imazethapyr 70 g/ha POE (T5), Imazethapyr 80 g/ha POE (T6), Imazethapyr. + Imazamox (RM) 50 g/ha PRE (T7), Imazethapyr.+ Imazamox (RM) 70 g/ha PRE (T8), Imazethapyr.+ Imazamox (RM) 80 g/ha PRE (T9), Imazethapyr.+ Imazamox (RM) 50 g/ha POE (T10), Imazethapyr.+ Imazamox (RM) 70 g/ha POE (T11), Imazethapyr.+ Imazamox (RM) 80 g/ha POE (T12), Pendimethalin 1000 g/ha PRE (T13), Imazethapyr + Pendimethalin (RM)1000 g/ha PRE (T14), Hoeing twice (T15) each performed at 20 and 40 DAS and weedy check (T16) replicated thrice. Blackgram *var.* T9 and mustard *var.* Shivani was sown at 30 cm using 30 and 8 kg seed/ha, with RDF 20:40:20 and 80:40:20 k g/ha, respectively. Application of Imazethapyr.+ Imazamox (RM) 80 g/ha POE (T12) also recorded higher yield attributes and grain and straw yield compared to rest of weed treatments.

**Keywords:** Herbicides, yield attributes and yield

## Introduction
Pulses are a good source of supplementary protein to daily diets based on cereals and starchy food for a predominantly vegetarian population and for those who cannot afford expensive animal protein. Pulses are therefore often regarded as poor man's meat. Pulses occupy a special place in human nutrition with protein (24%), carbohydrates (59.6%), fat (1.5%), minerals (3.2%) and it also contains 154 mg calcium, 9.1 mg iron and 38 mg beta-carotene per 100 g of dal. Their cultivation enriches soil by adding nitrogen and improves the physical, chemical and biological soil properties. Their short growing period and photoperiod sensitivity make them suitable for crop intensification and diversification. The average productivity of Black gram in Uttar Pradesh is far below as compared to other developed states like Andhra Pradesh, Madhya Pradesh, Maharashtra etc. The major cause of low productivity of black gram is weed as this crop is grown during rainy season which is known for heavy weed flux. Yield loss due to uncontrolled weed growth in black gram ranges from 27 to 100% (Singh & Singh, 2010) [5]. Most sensitive period of weed competition is in between 3 to 6 weeks after sowing.

## Materials and Methods
The experiment was conducted at Sri Durga Ji Post Graduate College, Chandeshwar, Azamgarh, (U.P.) during rainy and winter seasons of 2019-20 and 2020-21. The experiment was laid out in a RBD with 16 treatments i.e. Imazethapyr 50 g/ha PRE (T1), Imazethapyr 70 g/ha PRE (T2), Imazethapyr 80 g/ha PRE (T3), Imazethapyr 50 g/ha POE (T4), Imazethapyr 70 g/ha POE (T5), Imazethapyr 80 g/ha POE (T6), Imazethapyr. + Imazamox (RM) 50 g/ha PRE (T7), Imazethapyr. + Imazamox (RM) 70 g/ha PRE (T8), Imazethapyr. + Imazamox (RM) 80 g/ha PRE (T9), Imazethapyr. + Imazamox (RM) 50 g/ha POE (T10), Imazethapyr. + Imazamox (RM) 70 g/ha POE (T11), Imazethapyr. + Imazamox (RM) 80 g/ha POE (T12), Pendimethalin 1000 g/ha PRE (T13), Imazethapyr + Pendimethalin (RM) 1000 g/ha PRE (T14), Hoeing twice (T15) each performed at 20 and 40 DAS and weedy check (T16) replicated thrice. Blackgram *var.* T9 and mustard *var.* Shivani was sown at 30 cm using 30 and 8 kg seed/ha, with RDF 20:40:20 and 80:40:20 k g/ha, respectively.

## Results and Discussion

### Yield attributes

Yield attributes of black gram as influenced by weed control methods are presented in Table 1. Number of pods per plant and 1000 – seed weight, of blackgram was significantly influenced during 2019, 2020 and under pooled data are presented in Table 1. Among various levels and time of application of imazethapyr @ 80 g/ha pre emergence (T3) recorded higher compared to weedy check (T16) i.e. 10,10 and 10 during 2019, 2020 and under pooled data but it was similar to imazethapyr @ 80 g/ha post emergence (T6), imazethapyr + imazamox (RM) @ 70 g/ha pre emergence (T8), imazethapyr + imazamox (RM) @ 80 g/ha pre emergence (T9), imazethapyr + imazamox (RM) @ 70 g/ha post emergence (T10), pendimethalin 1000 g/ha pre emergence (T13), imazethapyr + pendimethalin (RM)1000 g/ha pre emergence (T14) and hoeing twice (T15) during 2019, 2020 and under pooled data also similar with imazethapyr @ 70 g/ha pre emergence (T2) during 2020 respectively.

Among various herbicides, application of imazethapyr + imazamox (RM) @ 80 g/ha post emergence (T12) recorded higher compared to weedy check (T16) during 2019, 2020 and under pooled data. However it was similar with imazethapyr + imazamox (RM) @ 70 g/ha post emergence (T11) during 2019, 2020 and under pooled data also similar with imazethapyr @ 80 g/ha post emergence (T3), imazethapyr + imazamox (RM) @ 70 g/ha pre emergence (T8), imazethapyr + imazamox (RM) @ 80 g/ha pre emergence (T9) and pendimethalin 1000 g/ha pre emergence (T13) during 2020 and under pooled data also similar with imazethapyr @ 70 g/ha pre emergence (T2), imazethapyr @ 80 g/ha post emergence (T6), imazethapyr + imazamox (RM) @70 g/ha post emergence (T10), imazethapyr + imazamox (RM) @ 70 g/ha post emergence (T11), imazethapyr + pendimethalin (RM) 1000 g/ha pre emergence (T14) and hoeing twice (T15) during 2020.

Pendimethalin 1000 g/ha pre emergence (T13) was next effective herbicide recorded higher compared to weedy check during 2019, 2020 and under pooled data and it was similar to imazethapyr @ 70 g/ha pre emergence (T2), imazethapyr @ 80 g/ha post emergence (T6), imazethapyr + imazamox (RM) @ 70 g/ha post emergence (T10), imazethapyr + pendimethalin (RM)1000 g/ha pre emergence (T14) and hoeing twice (T15) during 2019, 2020 and under pooled data also similar with imazethapyr + imazamox (RM) @ 70 g/ha pre emergence (T8) and imazethapyr + imazamox (RM) @ 80 g/ha pre emergence (T9) during 2019 and 2020 and similar with imazethapyr @ 50 g/ha pre emergence (T1), imazethapyr @ 50 g/ha post emergence (T4) and imazethapyr @ 70 g/ha post emergence (T5) during 2020 and under pooled data.

Number of seeds per pod of blackgram did not differ significantly by weed control methods during 2019, 2020 and under pooled data. However, imazethapyr + imazamox(RM) @ 80 g/ha post emergence (T12) recorded maximum number of seeds per pods followed by imazethapyr + imazamox (RM) @ 70 g/ha post emergence (T11) during 2019, 2020 and under pooled data respectively.

### Yield

Yield of blackgram as influenced by different weed control methods are presented in Table 2. Seed yield of black gram was significantly influenced by different weed control methods during 2019, 2020 and under pooled data. Among various levels and time of application of imazethapyr @ 80 g/ha as pre emergence recorded higher grain and straw yield compared to weedy check (T16) during 2019, 2020 and under pooled data. However it was similar to imazethapyr @ 80 g/ha post emergence (T6), imazethapyr + imazamox (RM) @ 70 g/ha pre emergence (T8), imazethapyr + imazamox (RM) @ 80 g/ha pre emergence (T9) and pendimethalin 1000 g/ha pre emergence (T13) during 2019, 2020 and under pooled data also similar with imazethapyr + imazamox (RM) @70 g/ha post emergence (T10), imazethapyr + pendimethalin (RM) 1000 g/ha pre emergence (T14) and hoeing twice (T15) during 2019 and 2020 and similar with imazethapyr @ 50 g/ha pre emergence (T1), imazethapyr @ 70 g/ha pre emergence (T2), imazethapyr @ 50 g/ha post emergence (T4) and imazethapyr @ 70 g/ha post emergence (T5) during 2020.

Application of imazethapyr + imazamox (RM) @ 80 g/ha post emergence (T12) recorded higher seed and straw yield compared to weedy check during 2019, 2020 and under pooled data, but it was on par with imazethapyr @ 80 g/ha pre emergence (T3), imazethapyr + imazamox (RM) @ 80 g/ha pre emergence (T9), imazethapyr + imazamox (RM) @ 70 g/ha post emergence (T11) and pendimethalin 1000 g/ha pre emergence (T13) during 2014, 2015 and under pooled data also similar with imazethapyr @ 80 g/ha post emergence (T6), imazethapyr + imazamox (RM) @ 70 g/ha pre emergence (T8) during 2019 and 2020 also similar with imazethapyr @ 50 g/ha pre emergence (T1), imazethapyr @ 70 g/ha pre emergence (T2), imazethapyr @ 70 g/ha post emergence (T5), imazethapyr + imazamox (RM) @70 g/ha post emergence (T10), imazethapyr + pendimethalin(RM) 1000 g/ha pre emergence (T14) and hoeing twice (T15) during 2020.

Pendimethalin 1000 g/ha pre emergence (T13) was similar to imazethapyr @ 80 g/ha post emergence (T6), imazethapyr + imazamox (RM) @ 70 g/ha pre emergence (T8), imazethapyr + imazamox (RM) @ 80 g/ha pre emergence (T9) during 2019, 2020 and under pooled data recorded higher seed and straw yield compared to weedy check during 2019, 2020 and under pooled data. Also similar with imazethapyr + pendimethalin (RM) 1000 g/ha pre emergence (T14) and hoeing twice (T15) during 2019 and 2020 and similar to imazethapyr @ 80 g/ha pre emergence (T3), imazethapyr + imazamox (RM) @ 70 g/ha pre emergence (T8) during 2019 while imazethapyr @ 50 g/ha pre emergence (T1), imazethapyr @ 70 g/ha pre emergence (T2), imazethapyr @ 70 g/ha post emergence (T5) during 2020. These results are confirmed with the finding of Nirala *et al*. (2012) [4], Chhodavadia *et al*., (2012) [2], Mundra and Maliwal (2012) [3] and Chavan *et al*., (2016) [1].

Yield attributes and Yield of mustard as influenced by residual effect of weed control methods performed in black gram are presented in Table 3 and 4. Yield attributes, grain yield and straw yield of mustard did not differ significantly by residual effect of weed control methods performed in black gram. However imazethapyr + imazamox @ 80 g/ha post emergence (T12) recorded maximum Yield attributes, grain yield and straw yield during 2019-2020, 2020-2021 and under pooled data, respectively. Imazethapyr + Imazamox (RM) @ 80 g/ha post emergence (T12) followed by Imazethapyr + Imazamox (RM) @ 70 g/ha post emergence (T11) recorded maximum straw yield under pooled data as compare to all other treatments (Table 3 and 4).

**Table 1:** Yield attributes of blackgram as influenced by weed control method in black gram crop.

| Treatment | 2019 | | | 2020 | | | Pool | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. of pod/Plant | No. of seed/Pod | 1000 Seed wt.(g) | No. of pod/Plant | No. of seed/Pod | 1000 Seed wt.(g) | No. of pod/Plant | No. of seed/Pod | 1000 Seed wt.(g) |
| T1 (Imaze. 50 g/ha PRE) | 12 | 7 | 31.51 | 15 | 7 | 33.01 | 13 | 7 | 32.26 |
| T2 (Imaze. 70 g/ha PRE) | 11 | 7 | 34.18 | 16 | 8 | 34.36 | 13 | 7 | 34.27 |
| T3 (Imaze. 80 g/ha PRE) | 14 | 6 | 35.92 | 17 | 6 | 36.64 | 16 | 6 | 36.28 |
| T4 (Imaze. 50 g/ha POE) | 12 | 6 | 31.13 | 15 | 6 | 31.86 | 13 | 6 | 31.50 |
| T5 (Imaze. 70 g/ha POE) | 13 | 6 | 31.69 | 15 | 7 | 33.39 | 14 | 6 | 32.54 |
| T6 (Imaze. 80 g/ha POE) | 15 | 7 | 35.70 | 16 | 7 | 35.78 | 16 | 7 | 35.74 |
| T7 (Imaze. + Imazamox 50 g/ha PRE) | 12 | 7 | 30.52 | 16 | 7 | 31.70 | 14 | 7 | 31.11 |
| T8 (Imaze. + Imazamox 70 g/ha PRE) | 14 | 6 | 35.70 | 18 | 7 | 36.04 | 16 | 7 | 35.87 |
| T9 (Imaze. + Imazamox 80 g/ha PRE) | 14 | 7 | 35.22 | 18 | 7 | 36.51 | 16 | 7 | 35.86 |
| T10 (Imaze. + Imazamox 50 g/ha POE | 16 | 7 | 34.94 | 17 | 7 | 35.19 | 16 | 7 | 35.06 |
| T11 (Imaze. + Imazamox 70 g/ha POE) | 19 | 7 | 36.10 | 18 | 7 | 38.23 | 18 | 7 | 37.16 |
| T12 (Imaze. + Imazamox 80 g/ha POE) | 20 | 8 | 37.89 | 19 | 8 | 38.44 | 19 | 8 | 38.16 |
| T13 (Pendim.1000 g/ha PRE) | 16 | 7 | 36.04 | 18 | 7 | 36.62 | 17 | 7 | 36.33 |
| T14 (Imaze. + Pendi.1000 g/ha) | 15 | 7 | 32.53 | 17 | 7 | 34.56 | 16 | 7 | 33.54 |
| T15(Hoeing twice) | 15 | 7 | 32.82 | 16 | 8 | 35.19 | 16 | 8 | 34.00 |
| T16 (weedy check) | 10 | 6 | 30.11 | 10 | 6 | 31.54 | 10 | 6 | 30.82 |
| S.Em± | 0.38 | 0.24 | 0.89 | 0.46 | 0.28 | 1.00 | 0.33 | 0.21 | 0.64 |
| CD=(0.05) | 1.15 | 0.71 | 2.67 | 1.36 | 0.85 | 2.99 | 0.98 | 0.62 | 1.91 |
| CV% | 4.74 | 6.16 | 4.57 | 4.85 | 7.08 | 4.97 | 3.76 | 5.28 | 3.23 |

**Table 2:** Yield (K g/ha) as influenced by weed management in black gram crop.

| Treatment | 2019 | | 2020 | | Pool | |
|---|---|---|---|---|---|---|
| | Seed Yield | Straw Yield | Seed Yield | Straw Yield | Seed Yield | Straw Yield |
| T1 (Imaze. 50 g/ha PRE) | 825 | 1856 | 869 | 1876 | 847 | 1866 |
| T2 (Imaze. 70 g/ha PRE) | 898 | 1921 | 919 | 2109 | 908 | 2015 |
| T3 (Imaze. 80 g/ha PRE) | 1057 | 2560 | 1076 | 2685 | 1066 | 2622 |
| T4 (Imaze. 50 g/ha POE) | 825 | 1741 | 858 | 1847 | 841 | 1794 |
| T5 (Imaze. 70 g/ha POE) | 892 | 1771 | 912 | 2082 | 902 | 1926 |
| T6 (Imaze. 80 g/ha POE) | 1016 | 2196 | 1029 | 2239 | 1022 | 2217 |
| T7 (Imaze. + Imazamox 50 g/ha PRE) | 825 | 1711 | 851 | 1838 | 838 | 1775 |
| T8 (Imaze. + Imazamox 70 g/ha PRE) | 1016 | 2314 | 1029 | 2403 | 1022 | 2359 |
| T9 (Imaze. + Imazamox 80 g/ha PRE) | 1051 | 2363 | 1071 | 2405 | 1061 | 2384 |
| T10 (Imaze. + Imazamox 50 g/ha POE | 988 | 2161 | 1016 | 2209 | 1002 | 2185 |
| T11 (Imaze. + Imazamox 70 g/ha POE) | 1068 | 2573 | 1092 | 2702 | 1080 | 2637 |
| T12 (Imaze. + Imazamox 80 g/ha POE) | 1101 | 2858 | 1118 | 2919 | 1110 | 2889 |
| T13 (Pendim.1000 g/ha PRE) | 1057 | 2482 | 1078 | 2562 | 1068 | 2522 |
| T14 (Imaze.+Pendi.1000 g/ha) | 907 | 2007 | 926 | 2174 | 917 | 2091 |
| T15 (Hoeing twice) | 921 | 2115 | 935 | 2205 | 928 | 2160 |
| T16 (weedy check) | 550 | 1698 | 580 | 1838 | 565 | 1768 |
| S.Em± | 46.70 | 139.30 | 74.07 | 128.83 | 53.85 | 104.49 |
| CD=(0.05) | 139.34 | 415.61 | 221.00 | 384.37 | 160.66 | 311.75 |
| CV% | 8.63 | 11.25 | 13.37 | 9.89 | 9.83 | 8.22 |

**Table 3:** Yield Attributes as influenced by weed control method in mustard crop.

| Treatments | 2019 | | 2020 | | | Pool | | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. of siliqua/Plant | No. of seed/ siliqua | 1000 Seed wt.(g) | No. of siliqua /Plant | No. of seed/ siliqua | 1000 Seed wt.(g) | No. of siliqua /Plant | No. of seed/ siliqua | 1000 Seed wt.(g) |
| T1 (Imaze. 50 g/haPE) | 253 | 8 | 3.54 | 265 | 8 | 3.84 | 259 | 8 | 3.69 |
| T2 (Imaze. 70 g/haPE) | 251 | 8 | 3.58 | 281 | 8 | 3.70 | 266 | 8 | 3.64 |
| T3 (Imaze. 80 g/haPE) | 256 | 7 | 3.70 | 273 | 7 | 3.59 | 265 | 7 | 3.65 |
| T4 (Imaze. 50 g/ha POE) | 245 | 7 | 3.56 | 271 | 7 | 3.58 | 258 | 7 | 3.57 |
| T5 (Imaze. 70 g/ha POE) | 246 | 7 | 3.58 | 260 | 7 | 3.68 | 253 | 7 | 3.63 |
| T6 (Imaze. 80 g/ha POE) | 276 | 7 | 3.63 | 296 | 8 | 3.74 | 286 | 8 | 3.69 |
| T7 (Imaze.+ Imazamox 50 g/haPE) | 262 | 7 | 3.54 | 292 | 7 | 3.52 | 277 | 7 | 3.53 |
| T8 (Imaze.+ Imazamox 70 g/haPE) | 273 | 7 | 3.64 | 295 | 7 | 3.80 | 284 | 7 | 3.72 |
| T9 (Imaze.+ Imazamox 80 g/haPE) | 254 | 7 | 3.70 | 273 | 7 | 3.80 | 264 | 7 | 3.75 |
| T10 (Imaze.+ Imazamox 50 g/ha POE) | 269 | 8 | 3.58 | 290 | 8 | 3.74 | 279 | 8 | 3.66 |
| T11 (Imaze.+ Imazamox 70 g/ha POE) | 278 | 7 | 3.78 | 299 | 8 | 3.85 | 289 | 7 | 3.82 |
| T12 (Imaze.+ Imazamox 80 g/ha POE) | 281 | 8 | 3.85 | 320 | 8 | 3.87 | 301 | 8 | 3.86 |
| T13 (Pendim.1000 g/haPE) | 279 | 7 | 3.70 | 301 | 8 | 3.83 | 290 | 7 | 3.77 |
| T14 (Imaze.+ Pendim. 1000 g/ha) | 244 | 8 | 3.58 | 295 | 8 | 3.70 | 270 | 8 | 3.64 |
| T15(Hoeing twice) | 256 | 8 | 3.58 | 272 | 8 | 3.74 | 264 | 8 | 3.66 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| T16( weedy check) | 253 | 7 | 3.53 | 270 | 7 | 3.51 | 262 | 7 | 3.52 |
| S.Em± | 11.30 | 0.33 | 0.14 | 21.03 | 0.54 | 0.18 | 11.77 | 0.29 | 0.13 |
| CD=(0.05) | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| CV% | 7.49 | 7.77 | 6.56 | 12.80 | 12.28 | 8.35 | 7.47 | 6.67 | 6.15 |

**Table 4:** Yield (K g/ha) as influenced by weed management in mustard crop.

| Treatments | Seed Yield | | | Straw Yield | | |
|---|---|---|---|---|---|---|
| | 2019-2020 | 2020-2021 | Pool | 2019-2020 | 2020-2021 | Pool |
| T1 (Imaze. 50 g/haPE) | 1217 | 1267 | 1242 | 2370 | 2594 | 2482 |
| T2 (Imaze. 70 g/haPE) | 1136 | 1216 | 1176 | 2199 | 2384 | 2292 |
| T3 (Imaze. 80 g/haPE) | 1100 | 1154 | 1127 | 2205 | 2344 | 2275 |
| T4 (Imaze. 50 g/ha POE) | 1097 | 1134 | 1115 | 2194 | 2339 | 2266 |
| T5 (Imaze. 70 g/ha POE) | 1134 | 1135 | 1134 | 2201 | 2316 | 2259 |
| T6 (Imaze. 80 g/ha POE) | 1164 | 1135 | 1150 | 2219 | 2334 | 2276 |
| T7 (Imaze.+ Imazamox 50 g/haPE) | 1100 | 1130 | 1115 | 2191 | 2296 | 2244 |
| T8 (Imaze.+ Imazamox 70 g/haPE) | 1169 | 1192 | 1180 | 2284 | 2368 | 2326 |
| T9 (Imaze.+ Imazamox 80 g/haPE) | 1184 | 1207 | 1195 | 2225 | 2399 | 2312 |
| T10 (Imaze.+ Imazamox 50 g/ha POE) | 1158 | 1159 | 1158 | 2209 | 2318 | 2264 |
| T11 (Imaze.+ Imazamox 70 g/ha POE) | 1225 | 1270 | 1247 | 2492 | 2554 | 2523 |
| T12 (Imaze.+ Imazamox 80 g/ha POE) | 1272 | 1357 | 1315 | 2678 | 2786 | 2732 |
| T13 (Pendim.1000 g/haPE) | 1189 | 1253 | 1221 | 2233 | 2491 | 2362 |
| T14 (Imaze.+ Pendim. 1000 g/ha) | 1097 | 1184 | 1140 | 2206 | 2365 | 2286 |
| T15 (Hoeing twice) | 1156 | 1138 | 1147 | 2243 | 2340 | 2291 |
| T16 (weedy check) | 1089 | 1127 | 1108 | 2192 | 2317 | 2255 |
| S.Em± | 74.44 | 77.83 | 49.94 | 172.58 | 160.00 | 150.91 |
| CD=(0.05) | NS | NS | NS | NS | NS | NS |
| CV% | 11.16 | 11.32 | 7.37 | 13.16 | 11.50 | 11.17 |

## Conclusion

- Imazethapyr + imazamox (RM) @ 80 g/ha post emergence recorded maximum yield attributes, grain yield of blackgram crop.
- Herbicides applied in blackgram had no residual phytotoxicity in succeeding mustard crop nor in soil.

## Recommendation

In the scarcity of laboures, the farmer may apply imazethapyr + imazamox (RM) @ 80 g/ha post emergence producing higher grain yield without phytotoxic effect on blackgram as well as succeeding mustard crop.

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