

EFFECT OF TILLAGE OPERATIONS AND IRRIGATION ON THE YIELD OF BENGAL GRAM (*Cicer arietinum*. L.)

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Gram is a crop which normally does not require a fine tilth. The land is prepared for this crop with two to three ploughings and harrowing. Out of over 25 million acres under Gram in India only about 1/8th is irrigated (Panikkar 1961). Very little information is available on the optimum cultural and irrigation requirements of this crop.

The present study was conducted to determine the effect of tillage operations and irrigation on the yield of Bengal Gram.

Materials and Methods

The experiment was conducted in the Agricultural College Farm, Banaras Hindu University during the year 1954-'55. The soil of the experimental site was clay loam and received channel irrigation. The experiment was laid out in a split plot design with six replications. Main plot treatments were three levels of ploughing and the sub plot treatments were two levels of irrigation. The treatments were:—

P1—two ploughings with country plough

P2—three —do— —do—

P3—four —do— —do—

I0—No irrigation

I1— One irrigation at field capacity.

There were six treatment combinations.

Preparatory cultivation of the plots was done by giving the number of ploughings corresponding to the respective main plot treatments. Seeding was done in December 1954 at a seed rate of 32 seers per acre. Irrigation water was applied to the respective plots 45 days after sowing. No intercultural operation was conducted. The crop was not given fertilizers and manures. Harvesting was done 116 days after sowing.

The plant characters studied were fresh weight of plants, length of shoots, length of roots and weight of seeds.

Results and Discussion

Results of the analysis of the data are presented in Tables 1 to 5. Table 1 gives the analysis of the data on the mean fresh weight of the plants and it may be seen that three ploughings give significantly higher fresh weight of plants than two ploughings.

Table 1

Mean fresh weight of Gram plants (in g.) under different tillage and irrigation levels

| | P ¹ | P ² | p ³ | Mean |
|-------------|-------------------------------|--------------------|----------------|--------|
| I0 | 90.53 | 131.47 | 131.23 | 117.74 |
| I1 | 87.18 | 98.75 | 87.42 | 91.12 |
| | 88.86 | 115.11 | 109.32 | 104.43 |
| SE (P Mean) | 6.99 | C D (P Mean at 5%) | | 22.04 |
| SE (I Mean) | 8.49 | G D (I Mean at 5%) | | 25.27 |
| | p ² p ³ | | P ¹ | |
| | I0 | | I1 | |

Irrigation gives significant decrease in the mean fresh weight of plants and thus has no favourable effect on this character.

Table 2

Mean dry weight of Gram plants (in g.) under different tillage and irrigation levels

| | P ¹ | p ² | P ³ | Mean |
|-------------|-------------------------------|--------------------|----------------|-------|
| I0 | 16.05 | 22.35 | 22.62 | 20.34 |
| I1 | 18.10 | 22.78 | 19.33 | 20.07 |
| | 17.07 | 22.57 | 20.97 | 20.21 |
| SE (P Mean) | 1.51 | C D (P Mean at 5%) | | 4.76 |
| SE (I Mean) | 1.69 | C D (I Mean at 5%) | | 5.09 |
| | p ² p ³ | | p ² | |
| | I0 | | I1 | |

Analysis of data of the dry weight of the plants is presented in Table 2. Three ploughings are found to give significantly higher dry weight of plants over two ploughings. Irrigation has no effect on dry weight of the plants.

Table 3

Mean length of shoot (in inches) under different tillage and irrigation levels

| | P ¹ | P ² | P ³ | Mean |
|----------------|----------------|--------------------|----------------|-------|
| I ⁰ | 32.33 | 33.46 | 33.34 | 33.04 |
| I ¹ | 33.04 | 35.49 | 33.14 | 33.89 |
| | 32.68 | 34.47 | 33.24 | 33.46 |
| SE (P Mean) | 0.96 | C D (P Mean at 5%) | | 3.03 |
| SE (I Mean) | 1.04 | C D (I Mean at 5%) | | 3.13 |

| | | |
|----------------|----------------|----------------|
| P ² | P ³ | P ¹ |
| I ¹ | | I ⁰ |

Table 3 gives the results of analysis of the data on the mean length of shoots. It is observed that length of shoot is not affected either by the number of ploughings or by irrigation.

Table 4

Mean length of root (in inches) under different tillage and irrigation levels

| | P ¹ | P ² | P ³ | Mean |
|----------------|----------------|--------------------|----------------|-------|
| I ⁰ | 14.55 | 15.48 | 18.12 | 16.05 |
| I ¹ | 12.60 | 13.98 | 16.60 | 14.39 |
| | 13.57 | 14.73 | 17.36 | 15.22 |
| SE (P Mean) | 1.13 | C D (P Mean at 5%) | | 3.56 |
| SE (I Mean) | 0.75 | C D (I Mean at 5%) | | 2.26 |

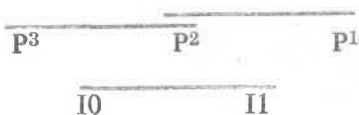
| | | |
|----------------|----------------|----------------|
| P ³ | P ² | P ¹ |
| I ⁰ | | I ¹ |

Analysis of data presented in Table 4 reveals that four ploughings give significantly higher length of roots over two ploughings. Irrigation has no effect on length of roots.

Table 5

Mean weight of seed (in seers) per plot under different tillage and irrigation levels

| | P ¹ | p ² | P ³ | Mean |
|----------------|----------------|--------------------|----------------|-------|
| I ⁰ | 10.22 | 12.91 | 12.42 | 11.85 |
| I ¹ | 8.91 | 10.74 | 12.11 | 10.59 |
| | 9.56 | 11.83 | 12.27 | 11.22 |
| SE (P Mean) | 0.475 | C D (P Mean at 5%) | | 1.50 |
| SE (I Mean) | 0.491 | C D (I Mean at 5%) | | 1.48 |



Data presented in Table 5 show that the weight of seed is affected by number of ploughings. Two ploughings are not found to be sufficient for increasing yield while three and four ploughings give significantly higher yields. There is no significant difference in seed yield between three ploughings and four ploughings. Irrigation has no effect on seed yield.

The results presented above will show that excepting the length of shoot all other characters studied, viz; fresh weight of plants, dry weight of plants, length of root and seed yield have been favourably influenced by increased number of ploughings. Though this crop is known not to require a

very fine tilth good aeration and clodless tilth provided by the increased tillage operations under the present studies seem to have influenced the factors studied favourably. Irrigation has however, no favourable influence on these factors.

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Reference

Panikkar M. R. Gram, *Fertilizer News*, 16(3) : 16-19.

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