**Data in Evaluation of dapog seed rate**

Figure 4.1 Mean seedling height at 3 DAS, 6 DAS, 9 DAS, 12 DAS in variety Bg 360

|  |
| --- |
| **Treatmen**t  T1 75 g/ tray  T2 100 g/ tray  T3 150 g/ tray  T4 200 g/ tray  **3 DAS**  6.366667  6.183333  5.71  5.176667  **6 DAS**  10.18  9.28  6.733333  5.676667  **9 DAS**  14.85  11.69  7.593333  6.35  **12 DAS**  18.43667  15.88667  11.695  9.69 |
|  |

Table 4.1 Height of seedlings (cm) as influenced by variation in seed rate of nursery tray Bg 360

**Figure 4.2 Mean seedling height at 3 DAS, 6 DAS, 9 DAS, 12 DAS in variety Bg 374**

|  |
| --- |
| **Treatmen**t  T1 75 g/ tray  T2 100 g/ tray  T3 150 g/ tray  T4 200 g/ tray  **3 DAS**  7.363333  7.18  6.473333  6.4  **6 DAS**  12.25333  11.72333  9.25  6.683333  **9 DAS**  16.12  15.77333  12.52333  7.785  **12 DAS**  19.66333  18.34333  15.75  10.47667 |
|  |

**Table 4.2 Mean height of seedlings (cm) as influenced by variation in seed rate of nursery tray Bg 374**

The height of the seedlings in the nursery trays recorded at 3 days intervals until 12 days age of two varieties Bg 360 and Bg 374 is presented in the Table 4.1 and 4.2 respectively and graphically illustrated in Figure 4.1 and 4.2. As regarded with different seed rates T1 (75 g/ tray) contributed to the maximum height in both varieties, as 18.43667 cm in Bg 360 and 19.66333 cm in Bg 374 in 12 Days after Sowing. It was followed by T2 (100 g/ tray) and T3 (150 g/ tray). The shorter seedlings were produced in T4 (200 g/ tray) in both varieties as 9.69cm in Bg 360 and 10.47667 cm in Bg 374. The mean seedling height of the two varieties in 3 DAS, 6 DAS, 9 DAS and 12 DAS showed significant reduction with the increased seed rate at 95% significant level. The similar results were recorded by the Gorgy, 2012, Lal and Roy, 1996 that proved seedling height increased with the reduced seed rate. The seedling height showed strong negative correlation with the seed rate in both varieties Bg 360 (R = -0.99045) and 374 (R = -0.95804).

Figure 4.3 Mean seedlings dry weight according to the seed rate in variety Bg 360

Figure 4.4 Mean seedlings dry weight according to the seed rate in variety Bg 374

The data pertaining to seedling dry weight (g 10 seedlings-1) of the two varieties at 12 Days after sowing were presented in Figure 4.3 and Figure 4.4.

In the variety Bg 360, the seedling dry weight is having a strong negative relationship (R= 0.92226) with the increment of seed rate use for nursery trays. The maximum seedling dry weight was recorded in T1 (75 g/tray) as 0.102283 g, followed by T2 (100 g/tray) 0.101 g. The two mean values of the T1 and T2 were not significantly differ at the 95% significant level. The lowest seedling dry weight was in T4 (200 g/tray) which was 0.061g. And also, there was no significant difference between the mean seedling dry weights of the T3 (150 g/tray) 0.0656 g and T4.

In the variety Bg 374 also the seedling dry weight is having a strong negative relationship (R=0.9421) with seed rate. The highest mean seedling dry weight 0.1412 g was in T1. The seedling dry weight of the T1 and T2 were not significantly differ at 95% significant level whereas there was no significant difference between the seedling dry weights of the T2 and T3. The lowest seedling dry weight 0.858 g was recorded in T4. Gorgy, 2012 and Pathania et al., 2016 also recorded the similar findings that there was a significant positive influence on seedling dry matter production by the lower seed rate in the nursery. The seedling dry weight showed a strong positive correlation with the seedling height and the total root length (cm 10 seedlings-1) in both varieties.

Figure 4.5 Mean total Root length of seedlings at 12 DAS in variety Bg 360

Figure 4.6 Mean total Root length of seedlings at 12 DAS in variety Bg 374

The mean total root length of the seedlings (cm 10 seedlings-1) of the two varieties at 12 DAS were illustrated in the Figure 4.5 and Figure 4.6 respectively. The mean total root length of 10 seedlings showed strong negative relationship with the both varieties Bg 360 (R = 0.9883) and Bg 374 (R = 0.9421).

In the variety Bg 360 there is no significant difference in the mean root lengths of T1, T2 and T3, T4 at the 95% significant level. The highest mean value for total root length was recorded in T1 as 280.6674 cm and the lowest value in T4 which was 167.7248 cm.

In the variety Bg 374 there is no significant difference in the total root length of T1, T2, T3. The longest root length was recorded in T1 and shortest total root length was recorded in T4 which were respectively 369.1555 cm and 309.9864 cm. The similar findings were reported by the Gorgy, 2012 that the root length of the seedlings decreased with increased seed rate. The reason for this was when the seed rate increased the roots are not having the opportunity to penetrate well towards the nursery medium. The adequate root length requires for the better establishment of seedlings after transplanted in the field through proper anchorage to the soil.

Figure 4.7 Number of seedlings dispensed per hill in mechanical transplanting according to seed rates in variety Bg 360

Figure 4.8 Number of seedlings dispensed per hill in mechanical transplanting according to seed rate in variety Bg 374

The mean number of seedlings dispensed per hill in low gear, mid gear and the high gear of the transplanter has a strong positive relationship with the seed rate in both varieties.

As defined by the Islam and Salam, 2017; Negalur and Halepyati, 2017; Oparka and Gates, 1982 the planting of 3 - 4 seedlings per hill significantly increased the growth of plants and the final yield. And also, there was no any impact in use of increased number of seedlings than that optimum level which caused miss use of seedlings resulting and extra expense on it.

The seedling vigor can be expressed in terms of root length, seedling height, dry matter production which changes according to the nursery seed rate (Gorgy, 2012; Lal and Roy, 1996; Matsuo and Hoshikawa, 1993; Rajendran et al., 2005)**.** When consider about these parameters the highest vigorous seedlings were produced at low nursery seed rate T1 (75g/tray) in both varieties Bg 360 and Bg 374 because with the increment of the seed rate the inter plant competition for the resource utilization was high which negatively affects on the seedling vigor. The number of seedlings per also important factor to consider when selecting the optimum seedling rate. The seedling height recommended for machine transplanting was 12 cm according to the Mamun et al., 2013. In the variety Bg 360 only the T1 (75g/tray) and T2 (100g/tray) fulfills this requirement. And in Bg 374 T1 (75g/tray), T2 (100g/tray), T3 (150g/tray) produced seedlings with more than 12 cm height.

The nursery tray requirement depends on the seed rate used for the nursery. So, the cost effectiveness also should be considered when selecting the seed rates.

The seed rate used for Mechanical Transplanting according to recommendation of Department of Agriculture (DOA), Sri Lanka.

Nadu (Bg 374) – 15 kg/acre

Samba (Bg 360) – (10 – 12) kg/acre

**Core relation for V1**

The SAS System 18:31 Wednesday, December 17, 2018 1

The CORR Procedure

6 Variables: trt sheight sdrywgt totalrtln chrlcont spersqmtr

Simple Statistics

Variable N Mean Std Dev Sum Minimum Maximum

trt 12 2.50000 1.16775 30.00000 1.00000 4.00000

sheight 12 13.92083 3.59087 167.05000 9.55000 18.70000

sdrywgt 12 0.08262 0.02031 0.99145 0.05800 0.10800

totalrtln 12 229.61658 57.90442 2755 118.83160 320.38140

chrlcont 12 31.36667 1.64114 376.40000 29.30000 34.10000

spersqmtr 12 217.60795 37.36961 2611 168.52300 271.29320

Pearson Correlation Coefficients, N = 12

Prob > |r| under H0: Rho=0

trt sheight sdrywgt totalrtln chrlcont spersqmtr

trt 1.00000 -0.99045 -0.90536 -0.83578 -0.23244 0.99373

<.0001 <.0001 0.0007 0.4672 <.0001

sheight -0.99045 1.00000 0.94475 0.85458 0.25014 -0.98792

<.0001 <.0001 0.0004 0.4330 <.0001

sdrywgt -0.90536 0.94475 1.00000 0.87115 0.29898 -0.90598

<.0001 <.0001 0.0002 0.3452 <.0001

totalrtln -0.83578 0.85458 0.87115 1.00000 0.21893 -0.85723

0.0007 0.0004 0.0002 0.4942 0.0004

chrlcont -0.23244 0.25014 0.29898 0.21893 1.00000 -0.20292

0.4672 0.4330 0.3452 0.4942 0.5271

spersqmtr 0.99373 -0.98792 -0.90598 -0.85723 -0.20292 1.00000

<.0001 <.0001 <.0001 0.0004 0.5271

**Core relation for Core relation for V2**

The SAS System 18:31 Wednesday, December 17, 2018 2

The CORR Procedure

6 Variables: trt sheight sdrywgt totalrtln chrlcont spersqmtr

Simple Statistics

Variable N Mean Std Dev Sum Minimum Maximum

trt 12 2.50000 1.16775 30.00000 1.00000 4.00000

sheight 12 16.05833 3.67536 192.70000 10.32000 19.86000

sdrywgt 12 0.11605 0.02305 1.39259 0.08030 0.14900

totalrtln 12 338.57693 22.18014 4063 304.02600 372.87560

chrlcont 12 31.74167 1.79365 380.90000 29.50000 35.70000

spersqmtr 12 183.18944 34.77137 2198 138.56406 231.51674

Pearson Correlation Coefficients, N = 12

Prob > |r| under H0: Rho=0

trt sheight sdrywgt totalrtln chrlcont spersqmtr

trt 1.00000 -0.95804 -0.85149 -0.96519 0.13672 0.98857

<.0001 0.0004 <.0001 0.6718 <.0001

sheight -0.95804 1.00000 0.85279 0.92113 -0.32246 -0.94388

<.0001 0.0004 <.0001 0.3067 <.0001

sdrywgt -0.85149 0.85279 1.00000 0.88298 -0.13187 -0.80957

0.0004 0.0004 0.0001 0.6829 0.0014

totalrtln -0.96519 0.92113 0.88298 1.00000 -0.20182 -0.91934

<.0001 <.0001 0.0001 0.5293 <.0001

chrlcont 0.13672 -0.32246 -0.13187 -0.20182 1.00000 0.05189

0.6718 0.3067 0.6829 0.5293 0.8728

spersqmtr 0.98857 -0.94388 -0.80957 -0.91934 0.05189 1.00000

<.0001 <.0001 0.0014 <.0001

**Data during nursery period until 12 days**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Broadcasting | Random Transplanting | Mechanical Transplanting | Parachute |
| 3 | 4.03 | 5.17 | 5.13 | 5.22 |
| 6 | 7.57 | 7.43 | 7.883333333 | 7.95 |
| 9 | 10.99 | 10.82333333 | 11.03666667 | 11.07466667 |
| 12 | 16.15666667 | 15.86333333 | 16.00666667 | 16.10333333 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DAS | Broadcasting | Random Transplanting | Mechanical Transplanting | Parachute |
| 3 | 4.503 | 5.386666667 | 5.266 | 5.266666667 |
| 6 | 8.34 | 8.28 | 8.37 | 8.456666667 |
| 9 | 11.34 | 11.28333333 | 11.31333333 | 11.43666667 |
| 12 | 17.34 | 16.88333333 | 17.08333333 | 17.17 |

|  |  |
| --- | --- |
| **Treatment** | **Total root length (cm)** |
| BC | 549.6874 |
| RT | 319.4599 |
| MT | 359.8712 |
| PA | 539.1324 |

|  |  |
| --- | --- |
| **Treatment** | **Total root length (cm)** |
| BC | 558.4719 |
| RT | 354.3483 |
| MT | 426.9147 |
| PA | 552.5194 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Broadcasting | Random Transplanting | Mechanical Transplanting | Parachute |
| SDW | 0.132133333 | 0.109066667 | 0.107666667 | 0.122733333 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Broadcasting | Random Transplanting | Mechanical Transplanting | Parachute |
| SDW | 0.3033 | 0.12 | 0.143833333 | 0.291766667 |

**Data after field establishment**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | BC | RT | MT | PA |
| 7 | 30.35952381 | 25.10277778 | 25.2 | 28.15925926 |
| 14 | 43.66944444 | 31.68888889 | 31.84391534 | 35.3952381 |
| 21 | 48.33333333 | 40 | 40.25833333 | 44.91111111 |
| 28 | 56.75714286 | 47.55833333 | 48.06666667 | 51.46666667 |
| 35 | 68.59925926 | 57.23333333 | 58.2 | 60.06666667 |
| 42 | 79.40740741 | 68.18888889 | 69.06666667 | 70.5 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | BC | RT | MT | PA |
| 7 | 43.19333333 | 32.18181818 | 32.87037037 | 34.32424242 |
| 14 | 49.03333333 | 40.2 | 41.7 | 43.2 |
| 21 | 58.0976431 | 49.43333333 | 50.38518519 | 55.15016835 |
| 28 | 66.66296296 | 60.04242424 | 61.11111111 | 63.53333333 |
| 35 | 78.3 | 70.44550265 | 71.23037037 | 73.53181818 |
| 42 | 89.94166667 | 79.06507937 | 79.93518519 | 82.95707071 |

The transplanted plants including Random transplanted, Mechanicaly transplanted and Parachute shows significantly low height (P<0.05) at early period after field establishment (7 DAS, 14DAS) compared to the Broadcasting in the two varieties Bg 360 and Bg 374 as the growth of the plants was disturbed when uprooting for field establishment. In the Mechanicaly transplanted and Random transplanted plants there was no significant difference of plant height in 7DAS and 14DAS as the transplanting shock due to the root damages occur in transplanting. A rapid increase in the plant height of the parachute transplanted plants was observed compared to the Mechanicaly transplanted and Random transplanted plants as low percentage of root damage compared to other two methods. From 21 DAS a significant different was observed in the plant height of four establishment methods in both varieties.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | BC | RT | MT | PA |
| 7 | 64.16666667 | 28.33333333 | 16.66666667 | 25 |
| 14 | 70 | 56.19 | 25 | 35.83333333 |
| 21 | 85.83333333 | 75.419 | 35 | 59.16666667 |
| 28 | 100 | 81.66666667 | 70 | 76.66666667 |
| 35 | 100 | 81.66666667 | 72.5 | 76.66666667 |
| 42 | 100 | 90.83333333 | 90 | 90.83333333 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | BC | RT | MT | PA |
| 7 | 41.666667 | 31.66666667 | 15.83333333 | 19.16666667 |
| 14 | 83.333333 | 40.83333333 | 18.33333333 | 25 |
| 21 | 89.166667 | 89.16666667 | 38.33333333 | 47.5 |
| 28 | 100 | 65.83333333 | 50.83333333 | 100 |
| 35 | 100 | 77.5 | 67.5 | 65.83333333 |
| 42 | 100 | 90.83333333 | 76.66666667 | 79.16666667 |

The Ground Cover increased above 50% in all the establishment methods at 28 Days after establishment (4th week), but always high in Broadcasting of rice compared to the transplanting methods of rice. The lowest ground cover percentage was observed at the Mechanicaly transplanted blocks in the early period which emphasize the requirement of proper weed management options. The ground coverage reached 100% in Broadcasted blocks of two varieties Bg 360 and Bg 374 at 28 Days after establishment.

V1

The SAS System 05:41 Thursday, December 22, 2018 1

The CORR Procedure

5 Variables: dwgt trl height12 height42DAS GC

Simple Statistics

Variable N Mean Std Dev Sum Minimum Maximum

dwgt 12 0.11790 0.01182 1.41480 0.10530 0.13850

trl 12 473.06358 93.86506 5677 331.86470 594.79730

height12 12 16.03250 0.12520 192.39000 15.80000 16.19000

height42DAS 12 71.79074 4.67993 861.48889 68.16667 80.00000

GC 12 92.91667 5.62395 1115 82.50000 100.00000

Pearson Correlation Coefficients, N = 12

Prob > |r| under H0: Rho=0

dwgt trl height12 height42DAS GC

dwgt 1.00000 0.76432 0.75327 0.78870 0.63363

0.0038 0.0047 0.0023 0.0269

trl 0.76432 1.00000 0.84659 0.68634 0.45028

0.0038 0.0005 0.0137 0.1419

height12 0.75327 0.84659 1.00000 0.71793 0.61166

0.0047 0.0005 0.0086 0.0346

height42DAS 0.78870 0.68634 0.71793 1.00000 0.74278

0.0023 0.0137 0.0086 0.0056

GC 0.63363 0.45028 0.61166 0.74278 1.00000

0.0269 0.1419 0.0346 0.0056

V2

The SAS System 05:41 Thursday, December 22, 2018 2

The CORR Procedure

5 Variables: dwgt trl height12 height42DAS GC

Simple Statistics

Variable N Mean Std Dev Sum Minimum Maximum

dwgt 12 0.21473 0.08929 2.57670 0.11050 0.30800

trl 12 442.03775 109.42677 5304 296.85490 563.34520

height12 12 17.11917 0.17428 205.43000 16.86000 17.39000

height42DAS 12 82.97475 4.48151 995.69701 78.66667 90.30000

GC 12 86.66667 10.57083 1040 70.00000 100.00000

Pearson Correlation Coefficients, N = 12

Prob > |r| under H0: Rho=0

dwgt trl height12 height42DAS GC

dwgt 1.00000 0.96249 0.84978 0.81412 0.28880

<.0001 0.0005 0.0013 0.3626

trl 0.96249 1.00000 0.85424 0.82458 0.21145

<.0001 0.0004 0.0010 0.5094

height12 0.84978 0.85424 1.00000 0.89288 0.32775

0.0005 0.0004 <.0001 0.2983

height42DAS 0.81412 0.82458 0.89288 1.00000 0.60462

0.0013 0.0010 <.0001 0.0373

GC 0.28880 0.21145 0.32775 0.60462 1.00000

0.3626 0.5094 0.2983 0.0373