**Stage-I**

**Clusterbean-Hanumangarh:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Treatment | Yield | AGB | E | T | I | P | Total H2O | D | N Uptake | N applied | Water entering soil | Water productivity |  |
|  |
|  |
| (kg/ha) | (kg/ha) | (mm) | (mm) | (mm) | (mm) | (mm) | (mm) | (kg N/ha) | (kg N/ha) | (mm) | (kg/m3 ET) |  |
| 20 kg N + 100 mm | 1362 | 5127 | 235 | 163 | 100 | 131 |  | 17 | 46 | 20 | 220 | 0.34 |  |
| 20 kg N + 200 mm | 1694 | 6119 | 274 | 202 | 200 | 131 |  | 78 | 35 | 20 | 320 | 0.36 |  |
| 20 kg N + 300 mm | 1729 | 6262 | 284 | 212 | 300 | 131 |  | 165 | 26 | 20 | 420 | 0.35 |  |
| 20 kg N + 400 mm | 1723 | 6245 | 284 | 212 | 400 | 131 |  | 263 | 24 | 20 | 520 | 0.35 |  |
| 20 kg N + 500 mm | 1725 | 6251 | 284 | 212 | 500 | 131 |  | 363 | 24 | 20 | 620 | 0.35 |  |
| 40 kg N + 100 mm | 1368 | 5148 | 235 | 163 | 100 | 131 |  | 50 | 17 | 40 | 220 | 0.34 |  |
| 40 kg N + 200 mm | 1702 | 6145 | 274 | 202 | 200 | 131 |  | 78 | 37 | 40 | 320 | 0.36 |  |
| 40 kg N + 300 mm | 1735 | 6278 | 284 | 212 | 300 | 131 |  | 165 | 28 | 40 | 420 | 0.35 |  |
| 40 kg N + 400 mm | 1725 | 6250 | 284 | 212 | 400 | 131 |  | 263 | 25 | 40 | 520 | 0.35 |  |
| 40 kg N + 500 mm | 1726 | 6253 | 284 | 212 | 500 | 131 |  | 363 | 25 | 40 | 620 | 0.35 |  |
| 60 kg N + 100 mm | 1377 | 5179 | 235 | 163 | 100 | 131 |  | 17 | 56 | 60 | 220 | 0.35 |  |
| 60 kg N + 200 mm | 1719 | 6202 | 274 | 202 | 200 | 131 |  | 78 | 42 | 60 | 320 | 0.36 |  |
| 60 kg N + 300 mm | 1748 | 6317 | 284 | 212 | 300 | 131 |  | 165 | 31 | 60 | 420 | 0.35 |  |
| 60 kg N + 400 mm | 1729 | 6263 | 284 | 212 | 400 | 131 |  | 263 | 26 | 60 | 520 | 0.35 |  |
| 60 kg N + 500 mm | 1729 | 6261 | 284 | 212 | 500 | 131 |  | 363 | 25 | 60 | 620 | 0.35 |  |

**Cotton-Hanumangarh:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Treatment | Yield | AGB | E | T | I | P | Total H2O | D | N Uptake | N applied | Water entering soil | Water productivity |  |
|  |
|  |
| (kg/ha) | (kg/ha) | (mm) | (mm) | (mm) | (mm) | (mm) | (mm) | (kg N/ha) | (kg N/ha) | (mm) | (kg/m3 ET) |  |
| 50 kg N + 200 mm | 949 | 3536 | 278 | 154 | 200 | 185 |  | 105 | 38 | 50 | 376 | 0.22 |  |
| 50 kg N + 300 mm | 781 | 3064 | 268 | 143 | 300 | 185 |  | 212 | 33 | 50 | 477 | 0.19 |  |
| 50 kg N + 400 mm | 777 | 3053 | 267 | 142 | 400 | 185 |  | 312 | 33 | 50 | 577 | 0.19 |  |
| 50 kg N + 500 mm | 779 | 3059 | 267 | 142 | 500 | 185 |  | 412 | 33 | 50 | 677 | 0.19 |  |
| 50 kg N + 600 mm | 784 | 3071 | 268 | 143 | 600 | 185 |  | 511 | 33 | 50 | 777 | 0.19 |  |
| 100 kg N + 200 mm | 1457 | 5213 | 303 | 183 | 200 | 185 |  | 88 | 61 | 100 | 374 | 0.30 |  |
| 100 kg N + 300 mm | 1245 | 4464 | 299 | 177 | 300 | 185 |  | 179 | 47 | 100 | 475 | 0.26 |  |
| 100 kg N + 400 mm | 1029 | 3743 | 285 | 162 | 400 | 185 |  | 293 | 39 | 100 | 576 | 0.23 |  |
| 100 kg N + 500 mm | 946 | 3514 | 279 | 155 | 500 | 185 |  | 399 | 37 | 100 | 676 | 0.22 |  |
| 100 kg N + 600 mm | 941 | 3501 | 279 | 155 | 600 | 185 |  | 500 | 36 | 100 | 776 | 0.22 |  |
| 150 kg N + 200 mm | 1505 | 5375 | 305 | 185 | 200 | 185 |  | 87 | 76 | 150 | 374 | 0.31 |  |
| 150 kg N + 300 mm | 1508 | 5385 | 311 | 190 | 300 | 185 |  | 167 | 66 | 150 | 474 | 0.30 |  |
| 150 kg N + 400 mm | 1428 | 5106 | 308 | 187 | 400 | 185 |  | 269 | 55 | 150 | 574 | 0.29 |  |
| 150 kg N + 500 mm | 1272 | 4555 | 300 | 178 | 500 | 185 |  | 367 | 47 | 150 | 675 | 0.27 |  |
| 150 kg N + 600 mm | 1142 | 4110 | 292 | 169 | 600 | 185 |  | 486 | 42 | 150 | 775 | 0.25 |  |
| 200 kg N + 200 mm | 1515 | 5409 | 305 | 185 | 200 | 185 |  | 87 | 79 | 200 | 374 | 0.31 |  |
| 200 kg N + 300 mm | 1527 | 5455 | 312 | 192 | 300 | 185 |  | 166 | 75 | 200 | 474 | 0.30 |  |
| 200 kg N + 400 mm | 1516 | 5413 | 311 | 191 | 400 | 185 |  | 265 | 68 | 200 | 574 | 0.30 |  |
| 200 kg N + 500 mm | 1491 | 5326 | 310 | 190 | 500 | 185 |  | 366 | 60 | 200 | 674 | 0.30 |  |
| 200 kg N + 600 mm | 1425 | 5088 | 308 | 187 | 600 | 185 |  | 469 | 54 | 200 | 774 | 0.29 |  |

**Wheat-Hanumangarh:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Treatment | Yield | AGB | E | T | I | P | Total H2O | D | N Uptake | N applied | Water entering soil | Water productivity |  |
|  |
|  |
| (kg/ha) | (kg/ha) | (mm) | (mm) | (mm) | (mm) | (mm) | (mm) | (kg N/ha) | (kg N/ha) | (mm) | (kg/m3 ET) |  |
| 50 kg N + 200 mm | 1291 | 4351 | 210 | 158 | 200 | 28 |  | 61 | 39 | 50 | 223 | 0.35 |  |
| 50 kg N + 300 mm | 1020 | 3581 | 200 | 146 | 300 | 28 |  | 131 | 35 | 50 | 324 | 0.29 |  |
| 50 kg N + 400 mm | 773 | 2911 | 184 | 129 | 400 | 28 |  | 243 | 31 | 50 | 424 | 0.25 |  |
| 50 kg N + 500 mm | 704 | 2770 | 181 | 126 | 500 | 28 |  | 346 | 30 | 50 | 524 | 0.23 |  |
| 50 kg N + 600 mm | 542 | 2223 | 164 | 108 | 600 | 28 |  | 463 | 27 | 50 | 624 | 0.20 |  |
| 100 kg N + 200 mm | 3080 | 7795 | 226 | 179 | 200 | 28 |  | 61 | 66 | 100 | 223 | 0.76 |  |
| 100 kg N + 300 mm | 2825 | 7473 | 240 | 194 | 300 | 28 |  | 106 | 60 | 100 | 323 | 0.65 |  |
| 100 kg N + 400 mm | 2396 | 6783 | 238 | 191 | 400 | 28 |  | 187 | 55 | 100 | 423 | 0.56 |  |
| 100 kg N + 500 mm | 1991 | 6039 | 233 | 185 | 500 | 28 |  | 292 | 49 | 100 | 523 | 0.48 |  |
| 100 kg N + 600 mm | 1672 | 5406 | 228 | 179 | 600 | 28 |  | 398 | 45 | 100 | 623 | 0.41 |  |
| 150 kg N + 200 mm | 3855 | 9124 | 226 | 180 | 200 | 28 |  | 61 | 97 | 150 | 223 | 0.95 |  |
| 150 kg N + 300 mm | 4081 | 9554 | 243 | 197 | 300 | 28 |  | 105 | 89 | 150 | 323 | 0.93 |  |
| 150 kg N + 400 mm | 3948 | 9281 | 246 | 199 | 400 | 28 |  | 181 | 82 | 150 | 423 | 0.89 |  |
| 150 kg N + 500 mm | 3654 | 8776 | 245 | 199 | 500 | 28 |  | 280 | 74 | 150 | 523 | 0.82 |  |
| 150 kg N + 600 mm | 3306 | 8219 | 244 | 198 | 600 | 28 |  | 381 | 67 | 150 | 623 | 0.75 |  |
| 200 kg N + 200 mm | 3913 | 9256 | 226 | 180 | 200 | 28 |  | 61 | 126 | 200 | 223 | 0.96 |  |
| 200 kg N + 300 mm | 4265 | 9964 | 244 | 198 | 300 | 28 |  | 105 | 119 | 200 | 323 | 0.96 |  |
| 200 kg N + 400 mm | 4288 | 10008 | 246 | 200 | 400 | 28 |  | 180 | 109 | 200 | 423 | 0.96 |  |
| 200 kg N + 500 mm | 4234 | 9886 | 246 | 200 | 500 | 28 |  | 278 | 97 | 200 | 523 | 0.95 |  |
| 200 kg N + 600 mm | 4125 | 9638 | 246 | 200 | 600 | 28 |  | 379 | 88 | 200 | 623 | 0.92 |  |

**Mustard-Hanumangarh:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Treatment | Yield | AGB | E | T | I | P | Total H2O | D | N Uptake | N applied | Water entering soil | Water productivity |  |
|  |
|  |
| (kg/ha) | (kg/ha) | (mm) | (mm) | (mm) | (mm) | (mm) | (mm) | (kg N/ha) | (kg N/ha) | (mm) | (kg/m3 ET) |  |
| 40 kg N + 100 mm | 1068 | 3237 | 130 | 98 | 100 | 8 |  | 28 | 45 | 40 | 106 | 0.47 |  |
| 40 kg N + 200 mm | 996 | 3019 | 127 | 94 | 200 | 8 |  | 18 | 37 | 40 | 119 | 0.45 |  |
| 40 kg N + 300 mm | 884 | 2679 | 121 | 88 | 300 | 8 |  | 221 | 31 | 40 | 306 | 0.42 |  |
| 40 kg N + 400 mm | 774 | 2347 | 114 | 81 | 400 | 8 |  | 325 | 27 | 40 | 407 | 0.40 |  |
| 60 kg N + 100 mm | 1127 | 3414 | 132 | 100 | 100 | 8 |  | 28 | 52 | 60 | 106 | 0.49 |  |
| 60 kg N + 200 mm | 1093 | 3311 | 132 | 99 | 200 | 8 |  | 117 | 46 | 60 | 206 | 0.47 |  |
| 60 kg N + 300 mm | 1051 | 3185 | 130 | 97 | 300 | 8 |  | 217 | 40 | 60 | 306 | 0.46 |  |
| 60 kg N + 400 mm | 980 | 2970 | 127 | 94 | 400 | 8 |  | 319 | 35 | 60 | 406 | 0.44 |  |
| 80 kg N + 100 mm | 1148 | 3477 | 133 | 101 | 100 | 8 |  | 28 | 55 | 80 | 106 | 0.49 |  |
| 80 kg N + 200 mm | 1135 | 3437 | 133 | 101 | 200 | 8 |  | 116 | 52 | 80 | 206 | 0.49 |  |
| 80 kg N + 300 mm | 1114 | 3374 | 133 | 100 | 300 | 8 |  | 216 | 48 | 80 | 306 | 0.48 |  |
| 80 kg N + 400 mm | 1080 | 3273 | 131 | 99 | 400 | 8 |  | 317 | 42 | 80 | 406 | 0.47 |  |
| 100 kg N + 100 mm | 1150 | 3485 | 133 | 101 | 100 | 8 |  | 28 | 57 | 100 | 106 | 0.49 |  |
| 100 kg N + 200 mm | 1147 | 3476 | 134 | 101 | 200 | 8 |  | 116 | 55 | 100 | 206 | 0.49 |  |
| 100 kg N + 300 mm | 1141 | 3456 | 133 | 101 | 300 | 8 |  | 216 | 52 | 100 | 306 | 0.49 |  |
| 100 kg N + 400 mm | 1124 | 3406 | 133 | 101 | 400 | 8 |  | 316 | 48 | 100 | 406 | 0.48 |  |

**Barley-Hanumangarh:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Treatment | Yield | AGB | E | T | I | P | Total H2O | D | N Uptake | N applied | Water entering soil | Water productivity |  |
|  |
|  |
| (kg/ha) | (kg/ha) | (mm) | (mm) | (mm) | (mm) | (mm) | (mm) | (kg N/ha) | (kg N/ha) | (mm) | (kg/m3 ET) |  |
| 50 kg N + 200 mm | 1083 | 5417 | 218 | 183 | 200 | 31 |  | 59 | 32 | 50 | 225 | 0.27 |  |
| 50 kg N + 300 mm | 1319 | 5553 | 284 | 247 | 300 | 31 |  | 101 | 30 | 50 | 325 | 0.25 |  |
| 50 kg N + 400 mm | 425 | 2767 | 279 | 226 | 400 | 31 |  | 218 | 18 | 50 | 426 | 0.08 |  |
| 50 kg N + 500 mm | 540 | 3779 | 314 | 269 | 500 | 31 |  | 276 | 21 | 50 | 525 | 0.09 |  |
| 50 kg N + 600 mm | 421 | 3390 | 304 | 258 | 600 | 31 |  | 384 | 19 | 50 | 625 | 0.07 |  |
| 100 kg N + 200 mm | 1751 | 7169 | 213 | 181 | 200 | 31 |  | 59 | 69 | 100 | 225 | 0.44 |  |
| 100 kg N + 300 mm | 3412 | 8928 | 268 | 238 | 300 | 31 |  | 101 | 65 | 100 | 325 | 0.67 |  |
| 100 kg N + 400 mm | 4315 | 10080 | 324 | 294 | 400 | 31 |  | 150 | 58 | 100 | 425 | 0.70 |  |
| 100 kg N + 500 mm | 3801 | 9385 | 336 | 305 | 500 | 31 |  | 242 | 48 | 100 | 525 | 0.59 |  |
| 100 kg N + 600 mm | 2660 | 8314 | 337 | 306 | 600 | 31 |  | 344 | 40 | 100 | 625 | 0.41 |  |
| 150 kg N + 200 mm | 1751 | 7169 | 213 | 181 | 200 | 31 |  | 59 | 75 | 150 | 225 | 0.44 |  |
| 150 kg N + 300 mm | 3419 | 8944 | 268 | 238 | 300 | 31 |  | 101 | 80 | 150 | 325 | 0.68 |  |
| 150 kg N + 400 mm | 4540 | 10596 | 323 | 293 | 400 | 31 |  | 150 | 75 | 150 | 425 | 0.74 |  |
| 150 kg N + 500 mm | 4564 | 10618 | 333 | 302 | 500 | 31 |  | 240 | 64 | 150 | 525 | 0.72 |  |
| 150 kg N + 600 mm | 4311 | 10061 | 334 | 304 | 600 | 31 |  | 340 | 55 | 150 | 625 | 0.68 |  |
| 200 kg N + 200 mm | 1751 | 7169 | 213 | 181 | 200 | 31 |  | 59 | 76 | 200 | 225 | 0.44 |  |
| 200 kg N + 300 mm | 3419 | 8944 | 268 | 238 | 300 | 31 |  | 101 | 86 | 200 | 325 | 0.68 |  |
| 200 kg N + 400 mm | 4546 | 10610 | 323 | 293 | 400 | 31 |  | 150 | 90 | 200 | 425 | 0.74 |  |
| 200 kg N + 500 mm | 4679 | 10884 | 333 | 302 | 500 | 31 |  | 240 | 79 | 200 | 525 | 0.74 |  |
| 200 kg N + 600 mm | 4633 | 10776 | 333 | 302 | 600 | 31 |  | 340 | 68 | 200 | 625 | 0.73 |  |