**Spring Cereal Forage Applied Water Use**

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**Introduction**

When years of drought continue, year after year, irrigation water availability is a huge issue. Forage production decreases dramatically, and livestock may need to be sold prematurely. Emergency feed production from cereal species can be a partial solution to producing emergency feed. If winter cereals were not planted in the Fall to help with maintaining or increasing forage needed for livestock; spring cereals can be planted to utilize any winter through early summer precipitation, along with limited irrigation water.

The following oat, barley, wheat, rye, and triticale spring cereal data are from the 1990-1993 cereal species and variety trials planted at the Central Oregon Ag Research Center at Powell Butte, Oregon. Materials and methods are provided in (Bohle et.al, 2002). The irrigation records accessed had solid set spacing dimensions, nozzle size, nozzle pressure, along with the number of hours the system was run for each event; inches-per-hour of water applied was able to be calculated. The hours were converted to inches per irrigation episode.

Harvest dates, at late boot or soft dough growth stage, were then used to subtract irrigation events back 6-9 days to previous irrigation events to allow a suitable time for the dry down of the foliage and soil so harvest could occur. Yield was divided by total inches of water applied to document applied water use to determine yield per inch of water applied.

Table 1 is a partial calendar of “day of year” dates. The data tables (tables 2-7) are sorted from least amount of water applied to most water applied. Yield, harvest date, water applied, and DM yield (pounds and tons/inch) per inch of water applied are presented in the tables.

Because of the way the irrigation system was set up at the Powell Butte site, extra lines sometimes needed to be run on different trials to reduce the pressure on the lines, so extra water was added in some years. *Due to the lack of an on-site weather station, rain and snow precipitation is not considered as part of the water use by the cereals, so is not added into the total water usage by the cereals.* The amount of irrigation water applied could be dramatically different in the late spring to early summer, annually, depending upon precipitation events. There have been years where there was absolutely no moisture in the soil at planting time, to years where there was enough winter, spring, and early summer moisture to harvest a large amount of forage with little to no additional irrigation water applied for a late spring harvest of perennial forage (one rare year).

If limited irrigation water availability quantity is known, this information can aid a producer in choosing which species and variety would be the best choice to plant to produce forage (although some of these varieties are not now currently available).

Bohle, M. Ballerstedt, P., Dovel, R., Karow, R, and Hannaway, D. (2002) Spring cereal forage varieties for central Oregon. Central Oregon Ag Research Center Annual Report. Oregon State University Ag Experiment Station. Special Report 1046. 27 pages.

<https://agsci.oregonstate.edu/sites/agscid7/files/coarec/publications/02_spring_cereal_forage.pdf>

Table 1. Day of year (doy) from January 1 starting with April 1 to September 1 and spring cereal forage planting date day of year, 1990 - 1993.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Year | Apr. 1 | Planting  Date  (doy) | May 1 | Jun. 1 | Jul. 1 | Aug. 1 | Sep. 1 |
| 1990 | 91 | 96 | 121 | 152 | 182 | 213 | 244 |
| 1991 | 91 | 113 | 121 | 152 | 182 | 213 | 244 |
| 1992 | 92 | 97 | 122 | 153 | 183 | 214 | 245 |
| 1993 | 91 | 125 | 121 | 152 | 183 | 213 | 244 |

doy – day of year from January 1.

**Results**

Table 2. Spring cereal forage trial yield, harvest date, water applied, yield (pounds and tons) per inch of water applied at COAREC, Powell Butte, Oregon in 1990. (Planted April 6, doy - 96)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variety | Species | DM  Yield  (t/ac) | Harvest  Date  (doy) | Water  Applied  (in) | DM Yield  per inch of  Water  Applied  (lb/in) | DM Yield  per inch of  Water  Applied  (ton/in) |
| **Soft Dough Harvest** | | | | | | |
| Haybet | Barley | 5.81 | 198 | 20.96 | 554 | 0.28 |
| Whitford | Barley | 4.80 | 198 | 20.96 | 458 | 0.23 |
| Westford | Barley | 5.84 | 202 | 20.96 | 557 | 0.28 |
| Koldbar | Barley | 5.58 | 202 | 22.28 | 501 | 0.25 |
| Belford | Barley | 4.40 | 204 | 23.60 | 373 | 0.19 |
| Cayuse | Oat | 6.06 | 207 | 23.60 | 514 | 0.26 |
| Kanota | Oat | 5.49 | 207 | 23.60 | 465 | 0.23 |
| Swan | Oat | 6.28 | 209 | 24.76 | 507 | 0.25 |
| Otana | Oat | 6.85 | 210 | 24.76 | 553 | 0.28 |
| Monida | Oat | 7.11 | 211 | 25.75 | 552 | 0.28 |
| Karl | Triticale | 7.04 | 212 | 25.75 | 547 | 0.27 |
| Sierra | Oat | 5.33 | 212 | 25.75 | 414 | 0.21 |
| Juan | Triticale | 7.25 | 213 | 25.75 | 563 | 0.28 |
| Twin | SWSW | 6.13 | 213 | 25.75 | 476 | 0.24 |
| Dirkwin | SWSW | 6.00 | 213 | 25.75 | 466 | 0.23 |

1990 Irrigation: 30 x 40 feet solid set spacing, 9/64-inch Rainbird nozzles, 55 PSI at Nozzle, 0.36-inches per hour application rate. Season First irrigation: April 13; Last irrigation: August 15.

Table 3. Spring cereal forage trial yield, harvest date, water applied, yield (pounds and tons) per inch of water applied at COAREC, Powell Butte, Oregon in 1991. (Planted April 22, doy - 113)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variety | Species | DM  Yield  (t/ac) | Harvest  Date  (doy) | Water  Applied  (in) | DM Yield  per inch of  Water  Applied  (lb/in) | DM Yield  per inch of  Water  Applied  (ton/in) |
| **Late Boot Harvest** | | | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Gazelle | Rye | 2.46 | 177 | 9.78 | 503 | 0.25 |
| Common | Rye | 2.13 | 183 | 10.07 | 423 | 0.21 |
| Karl | Triticale | 1.64 | 183 | 10.07 | 326 | 0.16 |
| Alamos 83 | Triticale | 1.40 | 183 | 10.07 | 278 | 0.14 |
| Eronga 83 | Triticale | 1.99 | 184 | 10.07 | 395 | 0.20 |
| Juan | Triticale | 2.19 | 186 | 10.07 | 435 | 0.22 |
| Grace | Triticale | 2.01 | 186 | 10.07 | 399 | 0.20 |
| **Soft Dough Harvest** | | | | | | |
| Belford | Barley | 4.16 | 204 | 17.6 | 473 | 0.24 |
| Koldbar | Barley | 4.09 | 204 | 17.6 | 465 | 0.23 |
| Haybet | Barley | 4.04 | 204 | 17.6 | 459 | 0.23 |
| Unkown | Barley | 3.83 | 204 | 17.6 | 435 | 0.22 |
| Westford | Barley | 3.29 | 204 | 17.6 | 374 | 0.19 |
| Whitford | Barley | 3.21 | 204 | 17.6 | 365 | 0.18 |
| Monida | Oat | 4.96 | 214 | 23.12 | 429 | 0.21 |
| Montezuma | Oat | 4.82 | 214 | 23.12 | 417 | 0.21 |
| Swan | Oat | 4.61 | 214 | 23.12 | 399 | 0.20 |
| Kanota | Oat | 4.40 | 214 | 23.12 | 381 | 0.19 |
| Cayuse | Oat | 3.54 | 214 | 23.12 | 306 | 0.15 |
| Otana | Oat | 5.47 | 215 | 23.12 | 473 | 0.24 |
| Sierra | Oat | 3.67 | 215 | 23.12 | 317 | 0.16 |
| Riel | Oat | 4.81 | 216 | 23.12 | 416 | 0.21 |
| Park | Oat | 4.10 | 216 | 23.12 | 355 | 0.18 |
| Texas Red | Oat | 4.85 | 217 | 23.12 | 420 | 0.21 |
| Grizzley | Oat | 3.95 | 217 | 23.12 | 342 | 0.17 |
| Dirkwin | SWSW | 5.50 | 221 | 25.88 | 425 | 0.21 |
| Twin | SWSW | 5.41 | 221 | 25.88 | 418 | 0.21 |
| Stampede | Oat | 4.13 | 221 | 25.88 | 319 | 0.16 |
| Winter Grey | Oat | 4.07 | 221 | 25.88 | 315 | 0.16 |

1991 Irrigation: 40 x 40 feet solid set spacing, 9/64-inch Rainbird nozzles, 40 PSI at nozzle, 0.23-inches per hour application rate. Season First irrigation: April 18; Last irrigation: September 20.

Table 4. Spring cereal forage late boot harvest yield, harvest date, water applied, yield (pounds and tons) per inch of water applied at COAREC, Powell Butte, Oregon in 1992. (Planted April 6, doy - 97)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variety | Species | DM  Yield  (t/ac) | Harvest  Date  (doy) | Water  Applied  (in) | DM Yield  per inch of  Water  Applied  (lb/in) | DM Yield  per inch of  Water  Applied  (ton/in) |
| **Late Boot Harvest** | | | | | | |
| Gazelle | Rye | 2.56 | 156 | 9.59 | 534 | 0.27 |
| Bedortha | Rye | 2.06 | 158 | 9.59 | 430 | 0.21 |
| Chopper | Barley | 3.28 | 159 | 9.59 | 684 | 0.34 |
| Wiemer | Barley | 2.97 | 159 | 9.59 | 619 | 0.31 |
| Montezuma | Oat | 2.58 | 159 | 9.59 | 538 | 0.27 |
| Arnzt | Rye | 1.83 | 159 | 9.59 | 382 | 0.19 |
| Common | Rye | 1.82 | 159 | 9.59 | 380 | 0.19 |
| Karl | Triticale | 3.28 | 161 | 10.67 | 615 | 0.31 |
| Alamos 83 | Triticale | 1.79 | 161 | 10.67 | 336 | 0.17 |
| Belford | Barley | 3.24 | 162 | 10.67 | 607 | 0.30 |
| Eronga 83 | Triticale | 2.02 | 162 | 10.67 | 379 | 0.19 |
| Fortuna | HRSW | 3.70 | 168 | 13.73 | 539 | 0.27 |
| Mondia | Oat | 3.62 | 168 | 13.76 | 526 | 0.26 |
| Juan | Triticale | 2.53 | 168 | 13.73 | 369 | 0.18 |
| Glenman | HRSW | 3.08 | 169 | 13.73 | 449 | 0.22 |
| Grace | Triticale | 2.90 | 169 | 13.73 | 422 | 0.21 |
| Westford | Barley | 4.68 | 170 | 14.81 | 632 | 0.32 |
| Lew | HRSW | 3.50 | 170 | 14.81 | 473 | 0.24 |
| Trical 2700 | Triticale | 3.47 | 170 | 14.81 | 469 | 0.23 |
| Dirkwin | SWSW | 2.71 | 170 | 13.73 | 395 | 0.20 |
| Riel | Oat | 3.29 | 171 | 14.81 | 444 | 0.22 |
| Texas Red | Oat | 3.89 | 173 | 14.81 | 525 | 0.26 |
| Grizzley | Oat | 4.11 | 175 | 16.25 | 506 | 0.25 |
| Winter Grey | Oat | 4.65 | 183 | 17.33 | 537 | 0.27 |
| Stampede | Oat | 4.34 | 189 | 18.77 | 462 | 0.23 |

1992 Irrigation: 30 x 40 feet solid set spacing, 9/64-inch Rainbird nozzles, 55 PSI at nozzle, 0.36-inches per hour application rate. Season First irrigation: April 20; Last irrigation: August 6.

Table 5. Spring cereal forage soft dough harvest yield, harvest date, water applied, yield (pounds and tons) per inch of water applied at COAREC, Powell Butte, Oregon in 1992. (Planted April 6, doy - 97)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variety | Species | DM  Yield  (t/ac) | Harvest  Date  (doy) | Water  Applied  (in) | DM Yield  per inch of  Water  Applied  (lb/in) | DM Yield  per inch of  Water  Applied  (ton/in) |
| **Soft Dough Harvest** | | | | | | |
| Chopper | Barley | 6.19 | 183 | 17.33 | 714 | 0.36 |
| Westford | Barley | 7.20 | 184 | 17.33 | 831 | 0.42 |
| Belford | Barley | 6.37 | 184 | 17.33 | 735 | 0.37 |
| Montezuma | Oat | 5.94 | 184 | 17.33 | 686 | 0.34 |
| Wiemer | Barley | 5.25 | 184 | 17.33 | 606 | 0.30 |
| Monida | Oat | 8.09 | 199 | 19.85 | 815 | 0.41 |
| Texas Red | Oat | 8.03 | 199 | 19.85 | 809 | 0.40 |
| Grizzley | Oat | 7.91 | 199 | 19.85 | 797 | 0.40 |
| Fortuna | HRSW | 7.87 | 199 | 19.85 | 793 | 0.40 |
| Riel | Oat | 7.70 | 199 | 19.85 | 776 | 0.39 |
| Lew | HRSW | 7.80 | 209 | 22.01 | 709 | 0.35 |
| Stampede | Oat | 8.40 | 212 | 23.09 | 728 | 0.36 |
| Winter Grey | Oat | 6.74 | 212 | 23.09 | 584 | 0.29 |
| Karl | Triticale | 8.42 | 216 | 24.17 | 697 | 0.35 |
| Glenman | HRSW | 8.13 | 216 | 24.17 | 673 | 0.34 |
| Alamos 83 | Triticale | 7.81 | 216 | 24.17 | 646 | 0.32 |
| Dirkwin | SWSW | 7.62 | 216 | 24.17 | 631 | 0.32 |
| Grace | Triticale | 10.52 | 217 | 25.25 | 833 | 0.42 |
| Juan | Triticale | 11.79 | 218 | 25.25 | 934 | 0.47 |
| Trical 2700 | Triticale | 10.49 | 218 | 25.25 | 831 | 0.42 |
| Bedortha | Rye | 7.62 | 218 | 25.25 | 604 | 0.30 |
| Eronga 83 | Triticale | 10.30 | 219 | 25.25 | 816 | 0.41 |
| Arnzt | Rye | 8.39 | 219 | 25.25 | 665 | 0.33 |
| Common | Rye | 8.07 | 219 | 25.25 | 639 | 0.32 |
| Gazelle | Rye | 7.24 | 219 | 25.25 | 573 | 0.29 |

1992 Irrigation: 30 x 40 feet solid set spacing, 9/64-inch Rainbird nozzles, 55 PSI at nozzle, 0.23-inches per hour application rate. Season First irrigation: April 20; Last irrigation: August 6.

Table 6. Spring cereal forage late boot harvest yield, harvest date, water applied, yield (pounds and tons) per inch of water applied at COAREC, Powell Butte, Oregon in 1993. (Planted May 4, doy - 125)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variety | Species | DM  Yield  (t/ac) | Harvest  Date  (doy) | Water  Applied  (in) | DM Yield  per inch of  Water  Applied  (lb/in) | DM Yield  per inch of  Water  Applied  (ton/in) |
| **Late Boot Harvest** | | | | | | |
| Montezuma | Oat | 2.15 | 179 | 9.84 | 437 | 0.22 |
| Gazelle | Rye | 1.89 | 179 | 9.84 | 384 | 0.19 |
| Swan | Oat | 1.88 | 179 | 9.84 | 382 | 0.19 |
| Faust | Barley | 2.01 | 181 | 9.84 | 409 | 0.20 |
| Alberta | Barley | 1.67 | 183 | 9.84 | 339 | 0.17 |
| Haybet | Barley | 2.51 | 186 | 10.56 | 475 | 0.24 |
| Eureka | Barley | 2.06 | 186 | 10.56 | 390 | 0.20 |
| Fortuna | HRSW | 1.98 | 186 | 10.56 | 375 | 0.19 |
| Nepal | Barley | 1.93 | 186 | 10.56 | 366 | 0.18 |
| Meloy | Barley | 1.64 | 186 | 10.56 | 311 | 0.16 |
| Glenman | HRSW | 1.57 | 187 | 10.56 | 297 | 0.15 |
| Cayuse | Oat | 3.28 | 188 | 10.56 | 621 | 0.31 |
| Magnum II | Oat | 2.88 | 188 | 10.56 | 545 | 0.27 |
| Ajay | Oat | 2.79 | 188 | 10.56 | 528 | 0.26 |
| Belford | Barley | 2.09 | 188 | 10.56 | 396 | 0.20 |
| Lew | HRSW | 1.85 | 188 | 10.56 | 350 | 0.18 |
| Florida 201 | Triticale | 1.73 | 188 | 10.56 | 328 | 0.16 |
| Eronga 83 | Triticale | 1.70 | 188 | 10.56 | 322 | 0.16 |
| Frank | Triticale | 1.68 | 188 | 10.56 | 318 | 0.16 |
| Otana | Oat | 3.15 | 189 | 10.56 | 597 | 0.30 |
| Mondia | Oat | 3.08 | 189 | 10.56 | 583 | 0.29 |
| Dirkwin | SWSW | 2.28 | 189 | 10.56 | 432 | 0.22 |
| Twin | SWSW | 2.35 | 190 | 10.56 | 445 | 0.22 |
| Juan | Triticale | 1.94 | 190 | 10.56 | 367 | 0.18 |
| Rid Awn | Barley | 2.08 | 191 | 12.90 | 322 | 0.16 |
| Ensiler | Oat | 3.35 | 192 | 12.90 | 519 | 0.26 |
| Park | Oat | 3.18 | 192 | 12.90 | 493 | 0.25 |
| Westford | Barley | 3.15 | 195 | 13.80 | 457 | 0.23 |
| Trical 2700 | Triticale | 2.57 | 195 | 13.80 | 372 | 0.19 |
| Magnum | Oat | 4.54 | 202 | 14.70 | 618 | 0.31 |
| Stampede | Oat | 4.36 | 205 | 14.70 | 593 | 0.30 |
| Whitman | Triticale | 2.60 | 206 | 14.70 | 354 | 0.18 |

1993 Irrigation: 30 x 40 feet solid set spacing, 9/64-inch Rainbird nozzles, 55 PSI at nozzle, 0.23-inches per hour application rate. Season First irrigation: May 12; Last irrigation: September 10.

Table 7. Spring cereal forage soft dough harvest yield, harvest date, water applied, yield (pounds and tons) per inch of water applied at COAREC, Powell Butte, Oregon in 1992. Planted May 4, doy - 125)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variety | Species | DM  Yield  (t/ac) | Harvest Date  (doy) | Water Applied  (in) | DM Yield  per inch of  Water  Applied  (lb/in) | DM Yield  per inch of  Water  Applied  (ton/in) |
| **Soft Dough Harvest** | | | | | | |
| Montezuma | Oat | 6.19 | 209 | 14.70 | 842 | 0.42 |
| Swan | Oat | 5.53 | 209 | 14.70 | 752 | 0.38 |
| Faust | Barley | 4.88 | 209 | 14.70 | 664 | 0.33 |
| Alberta | Barley | 4.34 | 209 | 14.70 | 590 | 0.30 |
| Eureka | Barley | 5.59 | 213 | 14.70 | 761 | 0.38 |
| Meloy | Barley | 5.51 | 213 | 14.70 | 750 | 0.37 |
| Haybet | Barley | 5.26 | 213 | 14.70 | 716 | 0.36 |
| Nepal | Barley | 5.03 | 213 | 14.70 | 684 | 0.34 |
| Cayuse | Oat | 6.98 | 214 | 14.70 | 950 | 0.47 |
| Ajay | Oat | 6.74 | 214 | 14.70 | 917 | 0.46 |
| Rid Awn | Barley | 5.62 | 216 | 16.14 | 696 | 0.35 |
| Ensiler | Oat | 7.63 | 217 | 16.14 | 945 | 0.47 |
| Magnum II | Oat | 7.45 | 217 | 16.14 | 923 | 0.46 |
| Mondia | Oat | 7.37 | 217 | 16.14 | 913 | 0.46 |
| Park | Oat | 7.27 | 217 | 16.14 | 901 | 0.45 |
| Otana | Oat | 6.70 | 217 | 16.14 | 830 | 0.42 |
| Westford | Barley | 6.66 | 217 | 16.14 | 825 | 0.41 |
| Belford | Barley | 6.03 | 217 | 16.14 | 747 | 0.37 |
| Magnum | Oat | 7.66 | 225 | 17.22 | 890 | 0.44 |
| Stampede | Oat | 6.87 | 225 | 17.22 | 798 | 0.40 |
| Fortuna | HRSW | 6.40 | 225 | 17.22 | 743 | 0.37 |
| Gazelle | Rye | 7.60 | 228 | 18.30 | 831 | 0.42 |
| Twin | SWSW | 6.32 | 230 | 19.74 | 640 | 0.32 |
| Dirkwin | SWSW | 6.62 | 231 | 19.74 | 671 | 0.34 |
| Glenman | HRSW | 6.10 | 231 | 19.74 | 618 | 0.31 |
| Lew | HRSW | 6.00 | 231 | 19.74 | 608 | 0.30 |
| Eronga 83 | Triticale | 9.37 | 242 | 19.74 | 949 | 0.47 |
| Frank | Triticale | 8.78 | 242 | 19.74 | 890 | 0.44 |
| Florida 201 | Triticale | 8.60 | 242 | 19.74 | 871 | 0.44 |
| Juan | Triticale | 9.25 | 244 | 19.74 | 937 | 0.47 |
| Trical 2700 | Triticale | 9.03 | 249 | 19.74 | 915 | 0.46 |
| Whitman | Triticale | 6.75 | 249 | 19.74 | 684 | 0.34 |

1993 Irrigation: 30 x 40 feet solid set spacing, 9/64-inch Rainbird nozzles, 55 PSI at nozzle, 0.23-inches per hour application rate. Season First irrigation: May 12; Last irrigation: September 10.

Table 8. Spring cereal forage regrowth from late boot harvest yield, harvest date, days after late boot harvest, DM yield (pounds and tons/acre) per day of regrowth at COAREC, Powell Butte, Oregon in 1992. (Planted May 4, doy -125)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variety | Species | DM  Yield  (t/ac) | Harvest Date  (doy) | Days After Late Boot  Harvest  (days) | DM Yield  per day of  regrowth (lb/day) | DM Yield  per day of  regrowth (ton/day) |
| **Regrowth From Late Boot Harvest** | | | | | | |
| Montezuma | Oat | 2.55 | 237 | 35 | 146 | 0.07 |
| Swan | Oat | 2.49 | 237 | 32 | 156 | 0.08 |
| Meloy | Barley | 1.05 | 237 | 46 | 46 | 0.02 |
| Belford | Barley | 0.96 | 237 | 51 | 38 | 0.02 |
| Faust | Barley | 0.88 | 237 | 51 | 35 | 0.02 |
| Westford | Barley | 0.82 | 237 | 58 | 28 | 0.01 |
| Alberta | Barley | 0.62 | 237 | 49 | 25 | 0.01 |
| Nepal | Barley | 0.60 | 237 | 49 | 24 | 0.01 |
| Eureka | Barley | 0.57 | 237 | 54 | 21 | 0.01 |
| Haybet | Barley | 0.69 | 239 | 51 | 27 | 0.01 |
| Rid Awn | Barley | 1.08 | 241 | 62 | 35 | 0.02 |
| Monida | Oat | 2.42 | 243 | 51 | 95 | 0.05 |
| Ajay | Oat | 2.33 | 243 | 51 | 91 | 0.05 |
| Otana | Oat | 2.25 | 243 | 54 | 83 | 0.04 |
| Cayuse | Oat | 1.93 | 243 | 54 | 71 | 0.04 |
| Magnum II | Oat | 1.54 | 243 | 55 | 56 | 0.03 |
| Park | Oat | 1.37 | 243 | 48 | 57 | 0.03 |
| Ensiler | Oat | 1.24 | 247 | 57 | 44 | 0.02 |
| Gazelle | Rye | 1.82 | 249 | 61 | 60 | 0.03 |
| Glenman | HRSW | 1.47 | 249 | 43 | 68 | 0.03 |
| Dirkwin | SWSW | 1.06 | 249 | 61 | 35 | 0.02 |
| Twin | SWSW | 0.96 | 249 | 68 | 28 | 0.01 |
| Lew | HRSW | 0.94 | 249 | 63 | 30 | 0.01 |
| Fortuna | HRSW | 0.85 | 249 | 70 | 24 | 0.01 |
| Florida 201 | Triticale | 2.40 | 255 | 67 | 72 | 0.04 |
| Eronga 83 | Triticale | 2.13 | 255 | 60 | 71 | 0.04 |
| Frank | Triticale | 1.30 | 255 | 69 | 38 | 0.02 |
| Whitman | Triticale | 1.14 | 255 | 66 | 35 | 0.02 |
| Juan | Triticale | 0.92 | 255 | 65 | 28 | 0.01 |
| Trical 2700 | Triticale | 0.67 | 255 | 67 | 20 | 0.01 |
| Stampede | Oat | 0.46 | 255 | 69 | 13 | 0.01 |
| Magnum | Oat | 0.33 | 255 | 68 | 10 | 0.00 |

1993 Irrigation: 30 x 40 feet solid set spacing, 9/64-inch Rainbird nozzles, 55 PSI at nozzle, 0.23-inches per hour application rate. Season - First irrigation: May 12; Last irrigation: September 10.