# Extreme yields in Manitoba

## If everything goes right, how high can yields go?

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Extreme seems to be the "in thing" these days — extreme sports, extreme travel, or extreme cold — so why not extreme yields?

Table 1 lists the average and extreme yields for 12 crops grown in Manitoba. The values in the "Average Yield" column are the average of the annual provincial yields from 1993 to 2002. For example the average for red spring wheat is around 34 bu/ac whereas canola averages 28 bu/ac.

Manitoba's average yields may not seem impressive on a world scale — until it is pointed out that they are achieved with a growing season that is typically 110 days. These yields would have been thought of as extreme or impossible 50 years ago — in fact "canola" didn't even exist as a crop 50 years ago.

The "Standard Deviation" column values in Table 1 are a statistical measure of variability of the average yields. They are used to calculate the theoretical yield values listed in the "Statistical Extreme Yield" column. Assuming the data is "normally distributed," then yields greater than the values in this column would only be expected to occur a little more than two per cent of the time. These are the theoretical extreme yields we can realistically expect from existing varieties under existing conditions. For example a statistical extreme yield for red spring wheat would be any yield greater than 55 bu/ac and for canola would be any yield greater than 46 bu/ac.

It is interesting that Manitoba's average yields are generally about half the theoretical extreme yields.

A non-statistical approach to determine the extreme yield is simply to survey what are the maximum yields actually reported by producers to Crop Insurance. The survey results are listed in "Maximum Actual Yield" column of Table 1 and are derived from reviewing Management Plus Program website variety query data over the period 1999 to 2002. To minimize the risk of accepting non-genuine reports, only average yields for each variety grown in one RM on a minimum of 200 acres by at least three growers were considered. It is also important to remember that declared yields are subject to random audits by MCIC and that when extreme yields are reported they are often subject to additional scrutiny for validity by MCIC staff.

These maximum yields can be substantial. For example Table 1 lists the maximum yield reported for red spring wheat as 71 bu/ac in 2003 and 102 bu/ac for barley in 1999. In most instances the maximum actual yield and statistical extreme yield values were similar and the maximum actual yield was usually slightly greater than the statistical extreme yield.

It is also interesting that for six of the 12 crops listed the maximum actual yield year was 2003. This emphasizes that 2003 was a year of extreme yields — unfortunately, for individual producers, not all the extreme yields were in a positive direction.

Researchers define "Yield Potential" as the yield of a cultivar when grown in an environment to which it is adapted, with nutrients and water non-limiting and with pests, diseases, weeds, lodging, and other stresses effectively controlled. The extreme yields in Table 1 represent the on-farm yield potential of these crops at some favoruable confluence of genotype, environment and management. These Utopian conditions rarely occur on any farm — but the yields achieved when they do are a benchmark of the current yield limits for these crops.

Establishing a maximum yield limit benchmark helps in identifying and prioritizing those situations with the greatest opportunity for increases. Producers and researchers alike can then focus their efforts on the identified factors that are most important in constraining current yields. It is only through continued focus on these constraints that crop yields in Manitoba will increase.

So impress your friends and neighbours, tell them you're into the newest extreme sport — "extreme"-ifying yields. It is likely harder to succeed at than most extreme sports — but a heck of a lot safer.

### Average and extreme yields of some crops in Manitoba

| CROP | AVERAGE YIELD (1993-2002) | STANDARD DEVIATION | STATISTICAL EXTREME YIELD* | MAXIMUM ACTUAL YIELD AND YEAR OF OCCURENCE | |
|---|---|---|---|---|---|
| Red Spring Wheat | 34 bu/ac | 10.3 bu/ac | > 55 bu/ac | 71 bu/ac | 2003 |
| Winter Wheat | 45 bu/ac | 15.8 bu/ac | > 77 bu/ac | 87 bu/ac | 2003 |
| Barley | 55 bu/ac | 19.5 bu/ac | > 94 bu/ac | 102 bu/ac | 1999 |
| Oats | 74 bu/ac | 28.2 bu/ac | > 130 bu/ac | 143 bu/ac | 2003 |
| Argentine Canola | 28 bu/ac | 8.9 bu/ac | > 46 bu/ac | 48 bu/ac | 2003 |
| Flax | 19 bu/ac | 7.3 bu/ac | > 33 bu/ac | 35 bu/ac | 2003 |
| Field Peas | 32 bu/ac | 13.8 bu/ac | > 60 bu/ac | 67 bu/ac | 2003 |
| Soybeans | 29 bu/ac | 8.7 bu/ac | > 47 bu/ac | 54 bu/ac | 2002 |
| Grain Corn | 85 bu/ac | 27.3 bu/ac | > 139 bu/ac | 136 bu/ac | 2001 |
| White Pea Beans | 1393 lbs/ac | 567 lbs/ac | > 2527 lbs/ac | 2588 lbs/ac | 2002 |
| Sunflowers | 1391 lbs/ac | 516 lbs/ac | > 2423 lbs/ac | 2387 lbs/ac | 1999 |
| Alfalfa Seed | 203 lbs/ac | 177 lbs/ac | > 556 lbs/ac | 426 lbs/ac | 2002 |

* Statistical extreme yield = Average Yield + (2 * Standard Deviation) -only around 2.5 % of yields greater than this value

** Actual average yield reported to MCIC by at least 3 growers on 200 acres in an RM - maximum in 1999 to 2003 period.