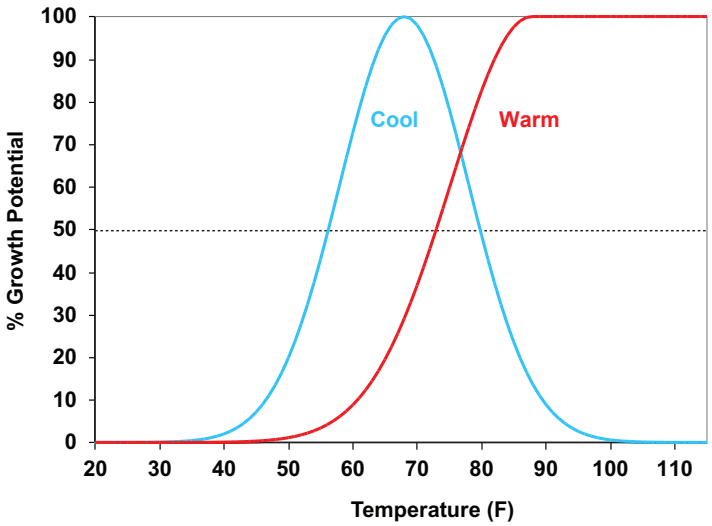
# Reference

## Growth Potential Values for cool season and warm season turf

We developed the growth potential model to explain myriad of ways in which weather impacts turf growth. The model considers turf growth to be good when the growth potential (GP) is between 50% and 100% (the best possible growth occurs at a GP of 100%). However, when weather conditions are either too hot or too cold for optimal turf growth, the GP falls below 50%, and turf becomes progressively more stressed. When the GP falls to 10% or lower, growth is extremely limited. Examples of growth potential graphs for selected U.S. locations are on the reverse side of this handout.

**Percent Turfgrass Growth Potential**

| Average Temp | | Cool Season | Warm Season | Average Temp | | Cool Season | Warm Season |
|---|---|---|---|---|---|---|---|
| C | F | %GP | %GP | C | F | %GP | %GP |
| 0.0 | 32 | 0 | 0 | 23.3 | 74 | 84 | 55 |
| 0.6 | 33 | 0 | 0 | 23.9 | 75 | 78 | 60 |
| 1.1 | 34 | 0 | 0 | 24.4 | 76 | 73 | 64 |
| 1.7 | 35 | 0 | 0 | 25.0 | 77 | 67 | 69 |
| 2.2 | 36 | 1 | 0 | 25.6 | 78 | 60 | 74 |
| 2.8 | 37 | 1 | 0 | 26.1 | 79 | 55 | 78 |
| 3.3 | 38 | 1 | 0 | 26.7 | 80 | 48 | 83 |
| 3.9 | 39 | 2 | 0 | 27.2 | 81 | 43 | 86 |
| 4.4 | 40 | 2 | 0 | 27.8 | 82 | 37 | 90 |
| 5.0 | 41 | 3 | 0 | 28.3 | 83 | 33 | 93 |
| 5.6 | 42 | 3 | 0 | 28.9 | 84 | 28 | 96 |
| 6.1 | 43 | 4 | 0 | 29.4 | 85 | 24 | 97 |
| 6.7 | 44 | 6 | 0 | 30.0 | 86 | 20 | 99 |
| 7.2 | 45 | 7 | 0 | 30.6 | 87 | 16 | 100 |
| 7.8 | 46 | 9 | 0 | 31.1 | 88 | 14 | 100 |
| 8.3 | 47 | 11 | 1 | 31.7 | 89 | 11 | 100 |
| 8.9 | 48 | 14 | 1 | 32.2 | 90 | 9 | 100 |
| 9.4 | 49 | 16 | 1 | 32.8 | 91 | 7 | 100 |
| 10.0 | 50 | 20 | 1 | 33.3 | 92 | 6 | 100 |
| 10.6 | 51 | 24 | 1 | 33.9 | 93 | 4 | 100 |
| 11.1 | 52 | 28 | 2 | 34.4 | 94 | 3 | 100 |
| 11.7 | 53 | 33 | 2 | 35.0 | 95 | 3 | 100 |
| 12.2 | 54 | 37 | 3 | 35.6 | 96 | 2 | 100 |
| 12.8 | 55 | 43 | 3 | 36.1 | 97 | 2 | 100 |
| 13.3 | 56 | 48 | 4 | 36.7 | 98 | 1 | 100 |
| 13.9 | 57 | 55 | 5 | 37.2 | 99 | 1 | 100 |
| 14.4 | 58 | 60 | 6 | 37.8 | 100 | 1 | 100 |
| 15.0 | 59 | 67 | 7 | 38.3 | 101 | 0 | 100 |
| 15.6 | 60 | 73 | 9 | 38.9 | 102 | 0 | 100 |
| 16.1 | 61 | 78 | 10 | 39.4 | 103 | 0 | 100 |
| 16.7 | 62 | 84 | 12 | 40.0 | 104 | 0 | 100 |
| 17.2 | 63 | 88 | 14 | 40.6 | 105 | 0 | 100 |
| 17.8 | 64 | 92 | 17 | 41.1 | 106 | 0 | 100 |
| 18.3 | 65 | 95 | 19 | 41.7 | 107 | 0 | 100 |
| 18.9 | 66 | 98 | 22 | 42.2 | 108 | 0 | 100 |
| 19.4 | 67 | 99 | 25 | 42.8 | 109 | 0 | 100 |
| 20.0 | 68 | 100 | 29 | 43.3 | 110 | 0 | 100 |
| 20.6 | 69 | 99 | 33 | 43.9 | 111 | 0 | 100 |
| 21.1 | 70 | 98 | 37 | 44.4 | 112 | 0 | 100 |
| 21.7 | 71 | 95 | 41 | 45.0 | 113 | 0 | 100 |
| 22.2 | 72 | 92 | 45 | 45.6 | 114 | 0 | 100 |
| 22.8 | 73 | 88 | 50 | 46.1 | 115 | 0 | 100 |




### Equation for calculating growth potential

The optimum temperature for cool season turf is 20C, and for warm season turf is 31C. The variance is set to 50/9 for cool season turfgrasses and 7 for warm season turfgrasses. Warm season grasses are not restricted by temperatures above 31C.

$$100 \times e^{\left(-\frac{1}{2}\left(\frac{\text{average temperature} - \text{optimum growth temperature}}{\text{variance}}\right)^2\right)}$$

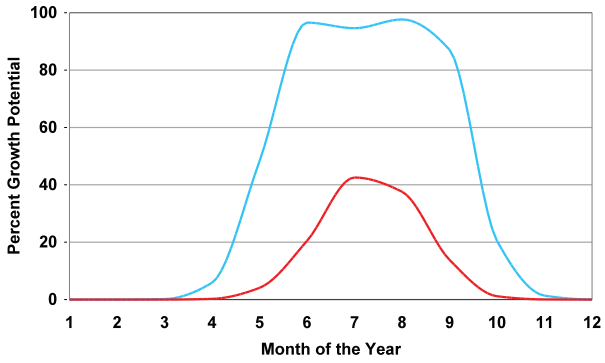
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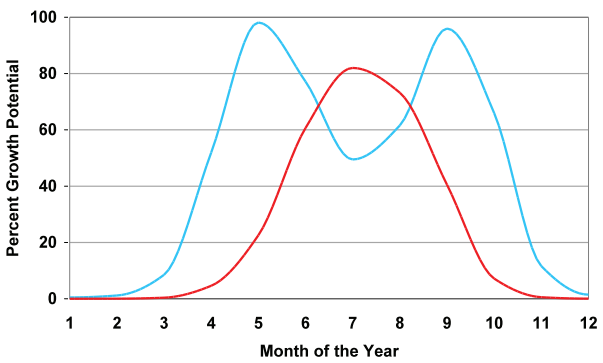
# Growth potential graphs for select U.S. locations

Percent growth potential of cool (blue line) and warm-season turf (red line).

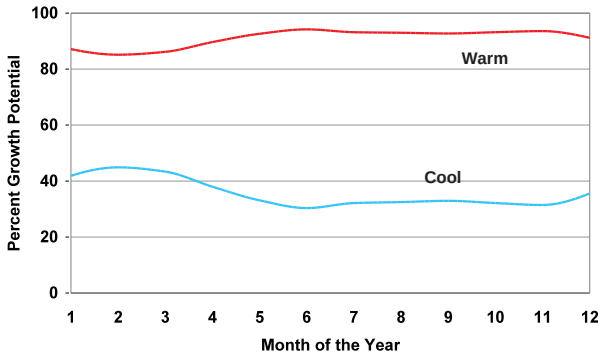
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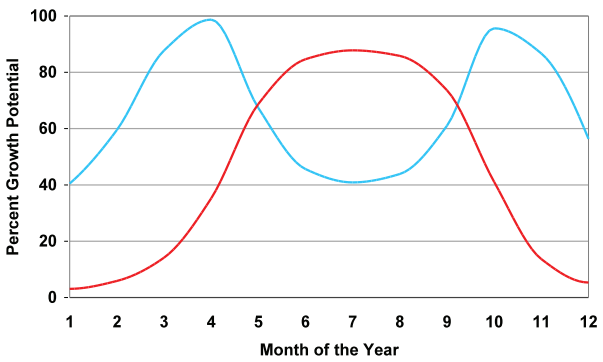

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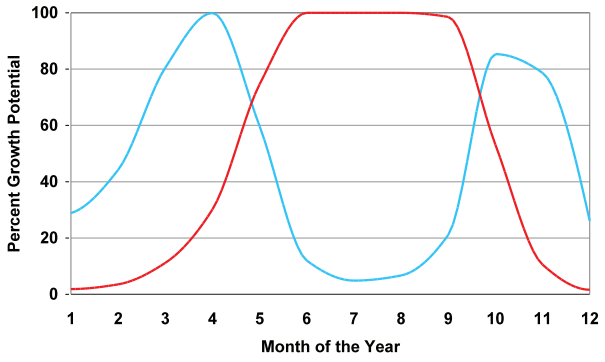

Guam



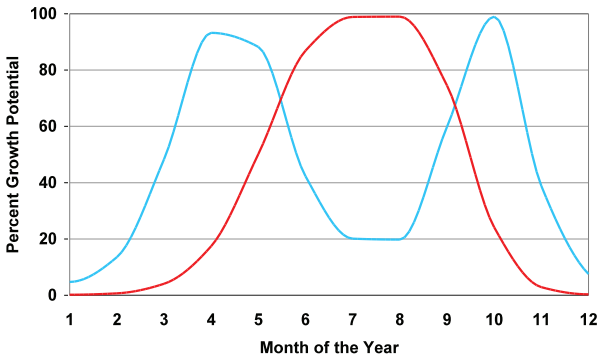

Gainesville, FL



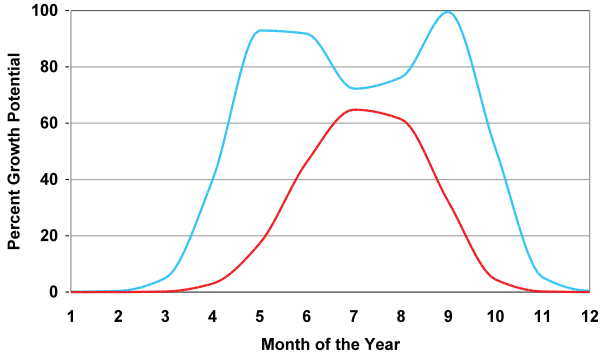

Phoenix, AZ



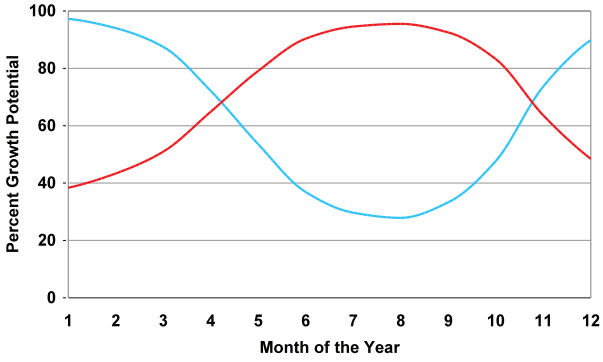

Dallas, TX




Lexington, KY




Miami, FL




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