Growth potentials

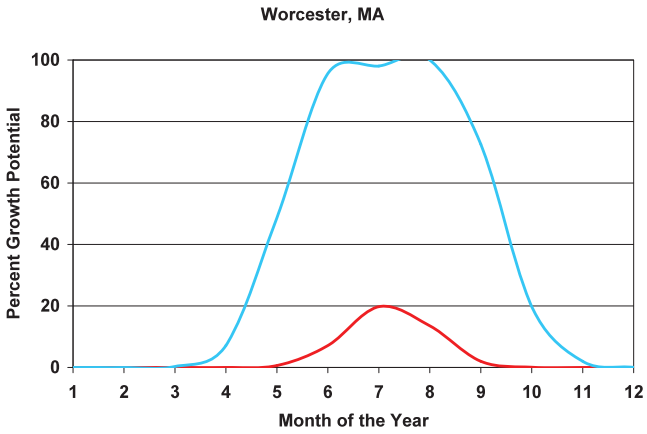
The concept of growth potential was developed to explain the myriad of ways in which weather impacts turf growth. The basic assumptions are that:

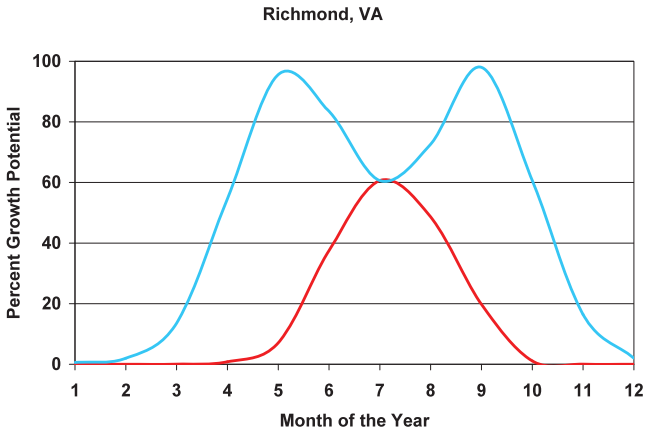
- turf growth is good when the growth potential (GP) is between 50% and 100%
- the best possible growth occurs at a GP of 100%.
- when weather conditions are either too hot or too cold for optimal turf growth, the GP falls below 50%, and turf becomes progressively more stressed. When the GP falls to 10% or lower, growth is extremely limited.
- Based on the scientific literature, cool-season turf grows best between average air temperatures of 60° and 75°F (with optimum growth at about 68F), while warm-season turf grows best at average air temperatures between 80° and 95°F (with optimum growth at about 88F).

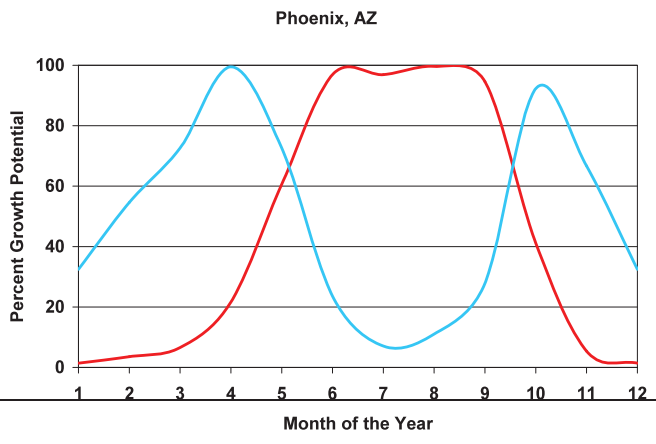
Using the growth potential concept

Growth potential data can be used to educate golfers and managers, to provide a scientific basis for decisions, to predict the performance of different turf types when exposed to different climates, and to forecast the effects of different overseeding and transition practices. Specific examples include:

- Timing application for chemical transition accelerators (Kerb, Revolver, Monument, Manor, Blade, TranXit): Warm-season turf GP should be 50% or higher at the time of application in order to ensure that sufficient warm-season turf cover is present.
- Scheduling aggressive management practices (aerification) or stressful events (tournaments): Turf growth potential should be as high as possible (greater than 50%) and on the rise when stressful events are scheduled. This allows for the greatest recovery potential of the turf.
- Explaining why cool- or warm-season turf is performing poorly (or well): Use growth potential to illustrate how your current weather conditions are affecting turf performance.







WEATHER REFERENCE

Percent growth potential (GP) of cool-season and warm-season turf at different average air temperatures

Air Temp (F)	%Warm GP	%Cool GP
38	0	1
39	0	2
40	0	2
41	0	3
42	0	4
43	0	5
44	0	6
45	0	8
46	0	10
47	0	12
48	0	15
49	1	18
50	1	22
51	1	26
52	1	30
53	2	35
54	2	40
55	3	46
56	3	52
57	4	58
58	5	64
59	6	70

Air Temp (F)	%Warm GP	%Cool GP
60	7	75
61	9	81
62	10	86
63	12	90
64	15	94
65	17	97
66	20	99
67	23	100
68	27	100
69	30	99
70	35	97
71	39	94
72	43	90
73	48	86
74	53	81
75	58	75
76	63	70
77	68	64
78	73	58
79	78	52
80	82	46
81	86	40

Air Temp (F)	%Warm GP	%Cool GP
82	90	35
83	93	30
84	96	26
85	98	22
86	99	18
87	100	15
88	100	12
89	99	10
90	98	8
91	96	6
92	93	5
93	90	4
94	86	3
95	82	2
96	78	2
97	73	1
98	68	1
99	63	1
100	58	1
101	53	0
102	48	0
103	43	0

Air Temp (F)	%Warm GP	%Cool GP
104	39	0
105	35	0
106	30	0
107	27	0
108	23	0
109	20	0
110	17	0
111	15	0
112	12	0
113	10	0
114	9	0
115	7	0
116	6	0
117	5	0
118	4	0
119	3	0
120	3	0
121	2	0
122	2	0
123	1	0

GROWTH POTENTIAL MODEL EQUATION

The growth potential values above were calculated using the equation below:

GP = growth potential

obsT = observed temperature (F)

optT = optimum turf growth temperature (F)

sd = standard deviation of the distribution

(sd warm = 12; sd cool = 10)

e = natural logarithm base **2.718282…**

$$GP := 100 \cdot \left[\frac{1}{e^{\left[\frac{1}{2} \left[\frac{(obsT - optT)}{sd} \right]^2 \right]}} \right]$$