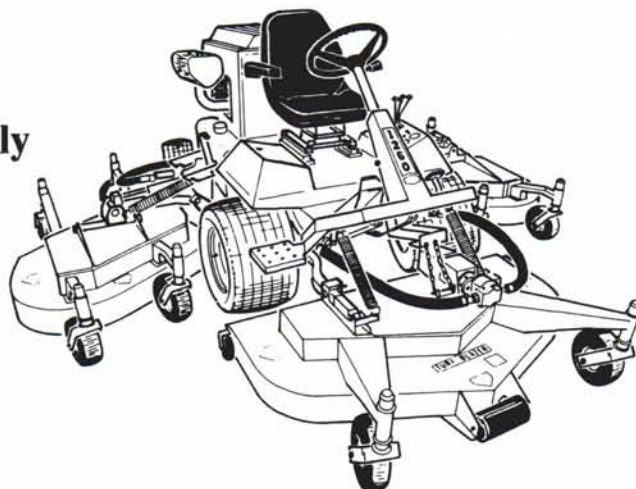


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## Late Fall Fertilization . . .

(continued from page 10)

November) while turf is actively growing, the plants begin to deplete carbohydrates and may not acclimate to the cold weather properly, thereby increasing potential for winter injury and disease.

Late fall fertilization has been promoted as a means of prolonging turf color into early winter without increasing the chance of winter injury and disease (winter color will be more noticeable in regions where winters are warmer and during mild winters). Late fall fertilization can also enhance spring green-up without the excessive stimulation of growth that often accompanies early spring fertilization. This green-up often will last into midspring.

Another reported benefit of late fall fertilization is an increase in rooting (though precisely when and how this increase occurs

---

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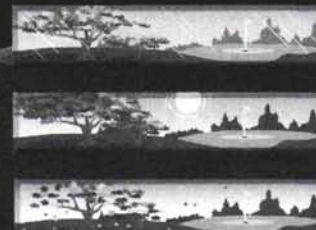
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is a source of some debate). While most fertilizer applications are made in spring and late summer in attempts to promote root growth, much of the fertilizer is used by the shoots, sometimes preferentially over roots. One reported advantage of late fall fertilization is that roots are still growing at a time when top growth has ceased, thus allowing the roots to make full use of the fertilizer. But, the roots are growing very slowly and if the soil is frozen, not at all.

Recent studies at Ohio State refute conventional thought that late fall fertilization increases rooting in winter. In fact, this research showed no increase in Kentucky bluegrass root growth during late fall or winter following late fall fertilizer application. However, when compared to early spring applications of nitrogen, late fall fertilization increased rooting in spring. Presumably, this benefit

(continued on page 14)

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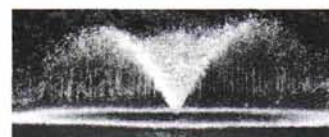
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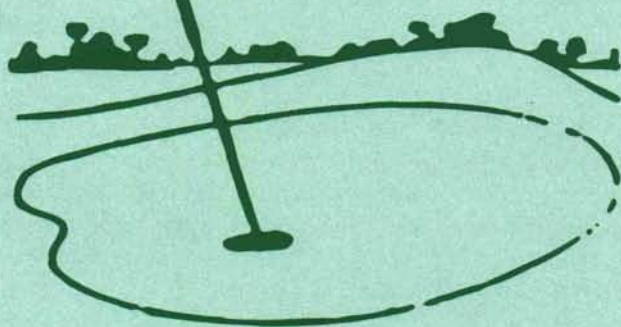
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## Late Fall Fertilization . . .

(continued from page 12)

was due to early spring green-up from a late fall application, which alleviated the need for early spring fertilization. When fertilizer was not applied in late fall but, instead, in early spring, excessive shoot growth occurred, depleting carbohydrate reserves that would have otherwise gone into root production later in spring.

The take-home message from the Ohio study is that while the net effect of late fall fertilization on rooting is slight, fertilizer applications in late fall may be more beneficial with respect to rooting than early spring applications.

Late fall fertilization is occasionally blamed for increased winter injury, snow mold and annual bluegrass encroachment. A few studies have been designed to examine the influence of late fall fertilization on winter injury, but none have conclusively demonstrated detrimental effects.

Heavy fertilization in mid-fall, when grass shoots are actively growing, can enhance snow mold (presumable due to reduced hardening and increased succulence of plant tissue). University research has shown that late fall fertilization may actually reduce winter diseases.

While some studies have shown increased annual bluegrass populations in fall, there is no good evidence to show that this increase is related to late fall fertilization.

### When to apply

Most experts agree that late fall fertilization should take place when foliar growth stops (or slows to the point that turf no longer needs to be mowed), grass is still green, and before the soil freezes. In Pennsylvania, this period usually occurs around Thanksgiving, however, it may occur later in the

southeastern portion of the state and earlier in northern regions. Application timing also may vary from year to year depending on weather conditions.

### Fertilizer sources and rates

Most late fall fertilization programs include moderate amounts of nitrogen, phosphorus and potassium. Rates of 1/2 to 1

nitrogen was applied at moderate rates in late fall (1 lb of N/1000 sq ft.) both urea and sulfur-coated urea provided a better early spring color response than Milorganite. However, when Milorganite or sulfur-coated urea was applied in late fall at a higher rate (2 lb. of nitrogen/1000 sq ft.), the spring green-up response was similar to that obtained from applications of urea at a lower rate (1 lb of N/1000 sq ft in late fall and 1/2 lb of N/1000 sq ft in early spring).

Slow or controlled-release nitrogen sources are generally preferable on sandy soils because of reduced potential for leaching. Nitrogen fertilizer should never be applied to frozen soil due to the increased chance of nutrient runoff.

### Suggested rates of nitrogen fertilizers for late fall fertilization

#### Bentgrass fairways and greens

1/2 lb soluble N/1000 sq ft

1 lb slow-release  
N/1000 sq ft.

#### Kentucky bluegrass/ perennial ryegrass/fine fescue lawns and grounds

1 lb soluble N/1000 sq ft.

1-1/2 to 2 lb. slow-release  
N/1000 sq ft.

---

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---

lb soluble N/1000 sq ft are recommended over higher rates (assuming a late summer application was made) to avoid winter injury, excessive growth in spring, and leaching or runoff.

A recent study at the University of Illinois showed that when

Although application timing is not as critical with phosphorus and potassium as with nitrogen, these elements can benefit turf when applied in late fall. Phosphorus is important in root growth and maturation of turfgrasses.

Application rates should be determined according to soil test

(continued on page 16)



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## Late Fall Fertilization . . .

(continued from page 14)

recommendations. If your soil test report indicates a need for phosphorus, late fall is a good time to fertilize. However, there is no need to apply additional phosphorus if it is present at sufficient levels.


Turfgrasses require potassium in relatively large amounts, so annual applications are usually required. This element enhances rooting, cold-hardiness, disease-resistance and wear-tolerance. For these reasons, late summer and late fall are ideal times to fertilize with potassium.

### Summary

Late fall fertilization should take place when shoot growth ceases, the grass is still green, and before the soil freezes. Benefits of fertilizing in late fall include better winter color, enhanced spring greenup, and increased rooting. Typically, low to moderate amounts of soluble nitrogen provide good turf color without excessive shoot growth in early spring. However, slow-release nitrogen sources can also provide a good color response in early spring when used at higher rates. To avoid potential leaching and runoff problems, use slow-release nitrogen sources on sandy soils. Do not apply fertilizer to frozen soils.



*Credit: The Keynoter, Fall 1995.*



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# 1997-1998 Snow Mold Fungicide Study

Dr. Rob Golembiewski  
Montana State University

A snow mold fungicide study was conducted during fall and winter 1997-98. The study was established at Riverside Country Club in Bozeman, Montana. The treatments were applied preventively October 21 to three replicate 6-by 9-ft. plots on a predominantly annual bluegrass mowed at one-half inch. Snow fell on October 23 and melted off by October 30. November was a sunny, dry month. Snow fell again on November 18 and melted off by November 24. Treatments with a split application were applied

November 24. Permanent snow cover began November 25 and ended March 31.

The study was rated on April 1, 1998, immediately following snow cover meltoff. The study had an approximate 70:30 mix of pink snow mold (*Microdochium nivale*) and gray snow mold (*Typhula ishikariensis* and *Typhula incarnata*). Disease severity was extremely high in the study with the untreated controls reaching levels of 95 percent (see table on page 20). The PCNB fungicides in combination with other products performed extremely well, as did the experimentals FL#971556 and FL#971557.

Phytotoxicity was noted on November 1 and 24. All products containing PCNB and the experimentals FL#971556 and FL#971557 resulted in discoloration of the turf. The phytotoxicity may have been compounded by the fact that November was a sunny, dry month. The discoloration was still observable on April 1. 

Credit: The Perfect Lie, August 1998

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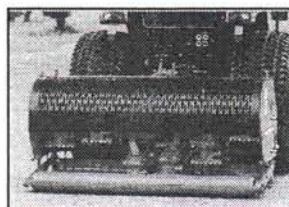
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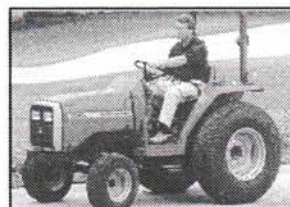
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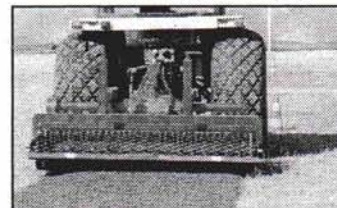
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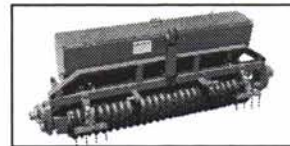
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## 1997-98 Snow Mold Fungicide Study

Riverside Country Club, Bozeman, MT

Rating Date: April 1, 1998

Rating Scale: Percent plot area infected by pink snow mold (*Microdochium nivale*) and grey snow mold (*Typhula ishikariensis*).<sup>2a</sup>

TREATMENT	RATE/1000 FT <sup>2b</sup>	REP 1	REP II	REP III	AVERAGE	LSD(0.05) <sup>c</sup>
Defend 4F + WAC71	9 fl. oz. + 12 fl. oz.	0	0	0	0.0	A
Defend 4F (Oct.) and Defend 4F + WAC 71 (Nov.)	8 fl. oz. and 9 fl. oz. + 12 fl. oz.	0	0	0	0.0	A
Chipco 26GT + Daconil Weatherstik + Turfcide 400	4 oz. + 5.5 oz. + 4 oz.	0	0	0	0.0	A
Chipco 26GT + Daconil Weatherstik + Turfcide 400	4 oz. + 5.5 oz. + 8 oz.	0	0	0	0.0	A
Heritage 50 WG + Turfcide 400	0.4 oz. + 12 oz.	0	0	0	0.0	A
Heritage 50 WG + X-77 (Oct.) and Heritage 50 WG + Turfcide 400 (Nov.)	0.4 oz. + 0.1% v/v 0.4 oz. + 12 oz.	0	0	0	0.0	A
FL#971557	6 fl. oz.	0	3	3	2.0	AB
Chipco 26GT + Turfcide 400	4 oz. + 8 oz.	5	2	5	4.0	ABC
Signature + Chipco 26GT + Daconil Ultrex	4 oz. + 4 oz. + 5 oz.	7	5	3	5.0	ABC
Heritage 50WG + Turfcide 400	0.7 oz. + 12 oz.	0	15	0	5.0	ABC
FL#971556	6 fl. oz.	0	15	5	6.7	A-D
Chipco 26GT + Daconil Weatherstik	4 oz. + 5.5 oz.	15	10	5	10.0	A-E
Fore + Turfcide 400	6 oz. + 8 oz.	5	10	15	10.0	A-E
Defend 4F	12 fl. oz.	15	15	5	11.7	A-E
Scotts FFII	103.8 oz.	15	10	10	11.7	A-E
Scotts FFII + Fungicide X	51.9 oz. + 115.4 oz.	15	7	15	12.3	A-E
Revere 4000	16 fl. oz.	20	10	10	13.3	A-E
Eagle + Fore	0.6 oz. + 8 oz.	10	10	25	15.0	A-E
WAC71	12 fl. oz.	20	20	15	18.3	A-F
L-0007	4 lbs.	25	25	20	23.3	B-G
AE207-97	6.66 lbs	15	25	40	26.7	C-G
Heritage 50WG	0.7 oz.	40	30	15	28.3	D-G
L-0006	4 lbs.	30	40	25	31.7	EFG
Heritage 50WG	5.58 gm.ai.	25	10	60	31.7	EFG
L-0009	4 lbs.	70	20	25	38.3	FGH
AE206-97	6.66 lbs.	65	30	25	40.0	FGH
AE204-97	6.66 lbs.	30	70	25	41.7	GH
AE205-97	6.66 lbs.	50	85	35	56.7	HI
RDS	7.43 gm.ai. + 0.1% v/v	60	35	80	58.3	HI
L-0008	4 lbs.	70	70	40	60.0	HI
Daconil Ultrex	8 oz.ai.	30	75	75	60.0	HI
Daconil Weatherstik	8 oz. ai.	20	95	100	71.7	IJ
RD2	0.93 gm.ai. + 0.1% v/v	95	70	60	75.0	IJK
RD4	3.72 gm.ai. + 0.1% v/v	75	80	75	76.7	IJK
RD3	1.86 gm.ai. + 0.1% v/v	90	70	75	78.3	IJK
RD1	0.46 gm.ai. + 0.1% v/v	90	85	85	86.7	JK
Fungicide X	115.4 oz.	100	95	75	90.0	JK
Sustane	30 lbs.	100	75	95	90.0	JK
Untreated Control		95	95	85	91.7	JK
Control (10-0-14)	6.66 lbs.	95	100	95	96.7	K

a Due to intermingled infection, separate disease ratings were not feasible.

b Rates listed are formulation unless listed as active ingredient (ai.).

c Treatments followed by the same letter are not significantly different from each other at the 5% level.

Credit: The Perfect Lie, August 1998