# Growing a Forage Program from the Ground UP

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4 Steps to growing a forage program

- 1. Developing the proper soil structure and biology
- 2. Understanding different forage growth phases
- 3. Timely harvesting to maximize individual goals
  - Economics drives the forage decisions



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# Soil Health Assessment – Mycorrhizal Fungi

Mycorrhiza, which means "fungus-root," is defined as a **beneficial, or symbiotic relationship between a fungus and the roots of its host plant**. This relationship is a natural infection of a plant's root system in which the plant supplies the fungus with sugars and carbon and receives water and/or nutrients in return.

# https://youtu.be/WttRfhRHsLo

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# **Soil Structure and Biology**

- The soil structure affects a soils ability to retain and transmit air, water, organic and inorganic substances that support root growth and development. It also plays an important role in improving soil productiveness, enhancing permeability, and preventing erosion.
- Critical decisions to select the right forage that will excel in your soils.
- Soils contain different characteristics that can be controled and changed over time.



# **Soil Structure and Biology**

Soil health is defined as the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans.





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# **Soil Structure and Biology**

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- The main principles to manage soil for health are:
- Maximize Presence of Living Roots
- Minimize Disturbance
- Maximize Soil Cover
- Maximize Biodiversity

AXIMIZE DOTORDANCE





# **Rain Fall Simulator – water infiltration rate**



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# Understanding the different Forage Growth Phases

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# **Corn growth and development**

GDU = (Daily Maximum Air Temperature + Daily Minimum Temperature)/2 - 50

86-50/2 = 18 GDU Average number of days from R1-R6 50-60 days R3 Kernel 80% moisture R4 Kernel 70% moisture 33% DM R5 Kernel 60% moisture 45% DM 30 days from pollination R6 Black layer

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30 days to fill last 55% DM or starch in the kernel



# **Corn DM accumulation: Grand Growth Phase**



Dry mass accumulation in corn relative to accumulation of GDU's and relation to growth stage. Red window indicates critical period of pollination through majority of grain fill. Arrow approximates when a fungicide applied at VT will no longer provide adequate protection of ear leaf and above under normal environmental conditions. Image ISU Extension, with modifications.

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# **Seasonal alfalfa management - Influences**

- Keys to winter survival Storage of carbohydrates and sugars Winter survival index
- Seasonal Challenges

Pest

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- Potato Leaf Hoppers
- Army Worms
- Alfalfa Weevils

Fertility program replacement of nutrients removed with crop Late cutting following extended period of wet weather







Many diseases caused by fungi affect alfalfa. Common leaf spot, Leptosphaeria leaf spot, spring black stem and leaf spot, and Stemphylium leaf spot are among the more important foliar diseases often encountered in the Upper Midwest.



# Tar Spot

- Keep in mind that this is not a rust that blows in at different times depending on weather patterns and abundance in warmer regions.
- It is most likely coming from the leftover stroma on the residue from the previous season. Once you have it , it becomes part of your management plan, just like GLS,NCLB, ear molds (mycotoxin).





# **Tarspotter smartphone app**

To help with the timing decision we have developed the **Tarspotter smartphone app**. We have been testing this app over the last couple of seasons. It is useful in that it can help you anticipate epidemics of tar spot to get fungicide applications on preventatively, when they will work the best. Figure 2 below shows the performance of a fungicide application applied using **Tarspotter versus a single application at the VT growth stage** versus the non-treated check. While the standard VT application did well, two-applications (one at the start of the epidemic at V10 and another at R2) were needed to hold tar spot off in 2021. As you can clearly see, Tarspotter can be used to make these comp

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# **Timely harvesting to maximize** individual goals

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# **Growth and maturity – Cereal Grains**

- Stage 9 Flag Leaf
- Stage 10 Boot

- Stage 10.1-10.5 Heading
- Stage 11 Ripening



# **Cereal Rye Grain – Forage crop**

- Rye is more cold- and drought-tolerant than wheat.
- Oats and barley do better than rye in hot weather.
- Rye is taller than wheat and tillers less. It can produce more dry matter than wheat and a few other cereals on poor, droughty soils but is harder to burn down than wheat or triticale
- Rye is a better soil renovator than oats, but brassicas and sudangrass provide deeper soil penetration
- Brassicas generally contain more N than rye, scavenge N nearly as well and are less likely to tie up N because they decompose more rapidly



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# **Cereal Crops** Fast tonnage

• Oats

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Seeding rate 70-90#/acre Forage DM yield 1 - 1.5 ton advantage over Barley

- Spring Triticale Advantage of drought tolerance Seeding rate 100#/acre
- Barley

Seeding rate 80-100#/acre

- Peas Improve forage quality
   Pea 60#/acre 50/50 mix
   Increase CP by 3-4% Highly degradable
   Decrease NDF 2-5%
   No significant yield increase
- Relative Maturity Wheat – Barley - Oats Triticale (wheat x rye)

## **Italian Rye Grass - Multiple harvest** Italian ryegrass (winter annual) spring planting Remains vegetative for maximum forage production Required cold period for reproduction vernalization similar to winter wheat High quality, leafy, palatable forage Protein improvement under seeding clovers · Inter seeding or new stand establishment Good seeding vigor Seed to soil contact essential New stands 35-40#/acre Inter seeding 15-30#/acre Under seeding with spring cereals Season long forage strategy Dry hay option??? PLUS **Midwest Dairy Conference 2022**

# **Advantages of Sorghum and Sudan**

- Excellent nutritional quality BMR 6 types
- Regrowth ability for multiple harvest and grazing
- Early maturity catch-crop following primary crop loss
- Rotational crop benefits
- Green-chop fresh forage
- High yielding and excellent fermentation silage
- High water use efficiency

# **High Tonnage Season-long yield**

- Corn Silage (King) everyone knows how to grow Best high tonnage option Correct planting and harvesting equipment Keep it simple
- Forage Silage
   Sorghum
   Sudan grass
   Sorghum / Sudan grass hybrids
   Millets
   Excellent nutritional quality BMR 6 types
   Multiple harvest and grazing regrowth
   Early maturity catch-crop
   Excellent fermentation silage

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# Winter Rye Grain fb Corn Sorghum split row planter





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### Fall seeding winter cereal fb Spring seeding Alfalfa

### Planned

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- Winter rye seeded Fall 2012
- 85# per acre

### Alternative alfalfa plan

- Spring 2013
- 20# per acre
- No till drill fb land roller





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# Economics drives the forage decisions

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### Forage yields in a continuous com silage rotation **Results – U of W Arlington** 12 10 8 Corn silage with no rye 8.6 6 Corn silage following rye 4 cover 9.2 2 0 Corn silage following rye 2012 2013 2014 2015 2016 forage 7.5 Com silage following rye cover - 9.2 Corn silage with no rye — 8.6 Corn silage following rye forage — 7.5 Rye forage — 1.8 Rye forage 1.8 versity of Wisconsin Arlington Research Station

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# **2021 Forage Strip Trial Results**

2021 Forage Fiel	Previous Crop Winter Rye Grain									
Product	Variety	Single Harvest Yield DM Tons	Starch	Protein	ADF	aNDFom	uNDFom 240	Sugar (WSC)	RFQ	DM
Cinteo	Pole Bean	0.00	21.7%	14.6%	20.6%	25.0%	11.2%		264	40.2%
CS SB	Mix	5.66	40.4%	8.5%	20.9%	35.1%	10.8%			40.5%
CS Cinteo	Mix	9.11	23.0%	10.9%	27.5%	43.3%	14.0%			36.4%
CS FS Cinteo	Mix	6.20	22.2%	9.3%	27.5%	46.0%	12.5%			29.5%
Earlage	113 RM Conv	7.21	63.9%	8.3%	7.1%	14.4%	2.6%			72.1%
нмс	113 RM Conv	5.18	72.0%	8.9%						68.8%
Corn Silage	113 RM Conv	9.73	42.3%	8.2%	18.4%	31.5%	7.8%			37.4%
SP3905	FS Early BD	6.02	21.1%	9.2%	29.2%	44.3%	14.2%	4.7%	149	33.2%
SP3904	FS Mid BD	5.61	26.9%	8.6%	26.5%	41.5%	12.0%	1.3%	167	29.9%
SP2774	FS BMR	6.00	25.8%	8.8%	30.4%	46.6%	15.1%	2.5%	138	28.9%
SS405	FS Full	8.08	17.8%	8.1%	35.4%	52.9%	16.7%	3.3%	112	28.9%
SWG 0395	GS Early	6.12	27.2%	9.5%	26.5%	38.4%	11.8%	2.4%	180	33.2%
SP68M57	GS Mid	6.54	29.8%	9.2%	24.0%	36.5%	11.1%	2.5%	191	36.7%
SP43M80	GS Late	5.57	29.2%	9.6%	27.5%	40.4%	13.1%	1.9%	156	32.2%

# 2020 Forage Strip Trial Results

SI SI SI TI TI SI A

- Continuous Corn
- Fall NH3 165#N

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- Spring Application
   32% 51#N
- Planted June 4
   Population 80-100,000
   30 in rows

			2nd							
		1st cutting	cutting							
		@49Days	@129Day							
		Yield DM	s DM				uNDFom	Sugar		
Product	Variety	Tons	Tons	Protein	ADF	aNDFom	240	(WSC)	RFQ	DM
6405	FS FULL		8.50	9.0%	33.42%	49.23%	14.11%	12.79	148	30%
93905BD	FS BD BMR EARLY		8.93	8.5%	24.23%	33.11%	10.65%	7.98	198	40%
ordan79	SXS	2.70	7.62	11.5%	35.40%	52.29%	13.06%	13.96%	135	36%
ordanHDLS	SXS	2.40	6.51	14.9%	36.75%	55.02%	12.28%	5.53%	165	33%
4105	SXS BMR PPS	1.75	6.27	15.0%	37.82%	52.71%	11.17%	6.43%	145	33%
4555	SXS BMR	2.18	6.00	15.6%	39.65%	48.47%	11.42%	5.39%	140	36%
udan8	SUDAN	1.58	5.98	18.4%	36.27%	48.24%	10.23%	4.34%	158	34%
udanHDLS	SUDAN	2.00	6.51	12.9%	38.38%	54.92%	14.48%	9.07%	156	41%
7106BMR	SUDAN BMR	2.34	7.45	16.1%	37.16%	51.05%	12.87%	9.12%	159	44%
F7401	FS FULL		6.70	8.0%	24.65%	37.77%	11.00%	10.2	176	35%