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Italian Ryegrass as a Nurse Crop for Perennial Forage

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When we seed alfalfa or other perennial forages, we often resign ourselves to expecting seeding-year yields no better than about 50% of establishment-year yields. We've often used oats or barley as nurse crops to boost seeding-year yields, provide some protection against erosion, and some competition against weeds. A drawback of those options though is they tend to reduce the quality of forage produced during the seeding year. That's not a big limitation for some, since many farms have at least some animals that don't need top-quality forage. Nevertheless, many producers have moved away from using nurse crops in an attempt to produce higher-quality forage.

Recent developments in the forage testing industry have given all of us a new perspective on the feeding value of grasses. Much of our perception regarding their feeding value has been based on the RFV index, which is a tremendous marketing tool, but primarily for alfalfa. RFV is based on fiber concentration in forage, and doesn't account for differences in how digestible that fiber may be. Grasses tend to be higher in fiber (NDF) than legumes, and thus tend to have lower RFV; thus, we have often assumed they have lower nutritional value to ruminants. Despite higher fiber content, grasses tend to have higher fiber (NDF) digestibility, so in terms of nutritional value to the animal, grasses aren't as inferior as we've often thought, and this may be especially true for grasses with high-quality potential like perennial and Italian ryegrass.

Italian ryegrass is a vigorous, leafy, high-quality, cool-season grass that usually grows as an annual in our part of the world, even though it has the potential to be a perennial in less severe climates. Some refer to Italian as late-maturing annual ryegrass. What we typically think of as annual ryegrass is sometimes referred to as early-maturing annual ryegrass. "True" annual and Italian ryegrasses differ in how they grow. Annual ryegrasses can produce seed heads with each growth cycle the year they are seeded. Italian ryegrasses will not produce seed heads in the seeding year. Thus, Italian ryegrass produces higher-quality, vegetative forage with each seeding-year cutting (or grazing), and it tends to remain vigorous and productive through late summer into fall.

Though annual ryegrasses can produce seed heads with each seeding-year cutting, their quality is still surprisingly high (higher than small grain forage). In addition, the "true" annual ryegrasses tend to be most productive through the summer, then slow down and become less competitive in the fall.

We had some experience with Italian and annual ryegrass in solid stands and as nurse crops during 2004. Those experiences included a replicated, small-plot trial of these grasses grown in solid stands on the Schefers Brothers Dairy Farm in Stearns County . Some yield and quality data from that study are shown in Tables 1 and 2 (on page 3.) Note that here the ryegrasses were seeded in monoculture at 30 lb/ac, not as nurse crops. Nevertheless, these data provide some perspective on the yield and quality potential of Italian ryegrass seeded at a lower rate as a nurse crop.

We also planted two on-farm nurse crop demonstrations; one in Polk Co. and the other in Fillmore Co. There, we compared annual, Italian, and perennial ryegrass to oats as a nurse crop. The under-seeding in Polk Co. was red clover and timothy. In Fillmore Co., it was alfalfa and reed canarygrass. In those trials, the Relative Forage Quality (RFQ) index of the 1 st-cutting forage was ~100 for oats, ~125 for headed annual ryegrass, and ~190 for Italian ryegrass. Total yield went in the opposite direction; greatest with oats and least with Italian ryegrass.

However, by the 2 nd cutting in August, highest yields were with annual ryegrass, followed by Italian ryegrass, then oats since the latter was now primarily just alfalfa whereas the ryegrass mixtures were ~25% alfalfa and 75% ryegrass. We seeded the ryegrasses fairly heavily in these demonstrations, at nearly 10 lb/ac, so we anticipate that alfalfa stands may be harmed; we'll see this spring when stands green up.

The University of Wisconsin did some work with Italian and annual ryegrass nurse crops in the early 1990's. They seeded several different varieties of these ryegrasses with alfalfa in mid-late April at Arlington in southern WI and at Marshfield in central WI. Some data from their trials are shown in Table 3 (on page 3.)

It should be noted that based on their work, they recommend annual over Italian ryegrass because they felt the latter was potentially too competitive (note first cutting yields the year after seeding). However, their last seeding-year cutting was in the first week of September. Based on our experience and their observations of the late-season vigor of Italian ryegrass, we feel that not taking a seeding-year October cutting may have contributed to over-competitiveness of Italian ryegrass with alfalfa. Spring-seeded winter-hardy alfalfa varieties are healthiest and thus most tolerant of October cutting before their first winter. In addition, ryegrass stubble may provide some insulation of alfalfa crowns and help to catch and hold insulating snow cover.

Our recommendations for trying Italian ryegrass as a nurse crop:

- Try it on a small acreage. We still have much to learn about the best ways to make this concept work.
- Seed no more than 5 lb/ac of Italian ryegrass. More may work, but be conservative to ensure that there isn't too much competition for the perennial(s).
- Plan to take an October cutting, so use only with perennial forage species and varieties that can handle a seeding-year fall cutting. This shouldn't be an issue with modern, winter-hardy alfalfa varieties in fertile, well-drained soils.
- Avoid seeding techniques that place the ryegrass seed right next to the perennial forage seed. Broadcasting both or at least one of the seeds should help reduce the competitive affect of Italian ryegrass on the slower-establishing perennial. Italian ryegrass can probably tolerate a broader range of seeding depths (1/4 to 1") than small-seeded perennials.
- Use 30-40 lb N/ac at establishment.
- Plan to cut often in the seeding year; first 50-60 days after emergence, and about every 30 days thereafter including a mid- to late October cut. Cut as close as you can at each cutting to slow the initial rate of Italian ryegrass regrowth and thus reduce its competitiveness.
- Plan to make haylage, baleage, or graze. Ryegrass is difficult to get dry enough for hay; it can be done, but it's difficult. If the under-seeded perennial is grass, a tedder may be effective in getting it dry enough to bale without significant DM and quality loss.

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Research Results on Italian Ryegrass—University of Minnesota Extension

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Table 1. Forage yield of selected Italian and annual ryegrasses in monoculture compared to standard grass species in 2004 near Paynesville (Stearns Co.), MN.

Variety	Species	June 29	July 23	Aug. 19	Sept. 27	Nov. 10	*Total*
		---------- *DM Yield (Ton/acre)* ----------					
Barextra	Italian (tetraploid)	1.0	1.9	1.7	1.5	0.5	*6.5*
Bardelta	Italian (diploid)	1.0	2.0	1.5	1.3	0.4	*6.2*
Jumbo	Annual (tetraploid)	1.2	2.0	1.3	1.5	0.3	*6.4*
LM 270	Annual (diploid)	0.9	1.7	1.3	1.6	0.4	*6.0*
Baridana	Orchardgrass	0.3	1.0	1.2	1.1	0.2	*3.7*
Marathon	Reed canarygrass	0.2	1.1	0.5	0.7	--	*2.5*
Robust	Barley	2.4	0.3	--	--	--	*2.6*
Jim	Oats	1.5	0.7	--	--	--	*2.3*
	LSD (0.05)	*0.2*	*0.2*	*0.3*	*0.3*	*0.1*	*0.6*

Table 2. Forage quality of Italian ryegrass averaged/totaled over four of five harvests, and at a September harvest compared to orchardgrass, in Stearns Co., MN plots in 2004.

Variety	Description	Harvest(s)	RFQ	RFV	Milk/Ton	Milk/Acre
					Lb/ton	*Lb/ac*
Barextra	Tetraploid	Four	193	143	3,130	19,000
Bardelta	Diploid	Four	181	138	3,030	17,500
Barextra	Tetraploid	Sept. 27	164	119	2,930	4,480
Bardelta	Diploid	Sept. 27	150	111	2,750	3,520
Baridana	Orchardgrass	Sept. 27	124	101	2,160	2,400

Table 3. Seeding-year yield and quality of annual and Italian ryegrass mixtures with alfalfa harvested three times by early September and averaged over four environments in Wisconsin (Sulc and Albrecht, 1996).

Ryegrass		DM Yield	NDF	ADF	Next Year's Spring Yield
		Ton/acre	------ *%* -----		*Ton/acre*
Annual	Diploid	3.7	50.0	29.2	1.6
Annual	Tetraploid	3.7	50.5	28.8	1.3
Italian	Diploid	3.2	46.5	26.5	1.1
Italian	Tetraploid	3.3	44.3	24.8	1.2
None	Solo Alfalfa	2.8	39.1	25.1	1.7