

Sainfoin

An Alternative Forage

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Taxonomy of Sainfoin

► Taxonomy:

Family Fabaceae (Leguminosae), genus *Onobrychis*, species *viciifolia*

Traditional forage crop in Europe and Russia

French word for sainfoin is “esparcette” meaning wholesome hay

Holy Clover

Grown in Europe for 500 Years



Sainfoin growing in the calcareous soils of southern France.

Attributes of Sainfoin

- **Non-bloating characteristic of green forage in ruminant animals**
- **Extremely palatable and nutritional forage**
- **Resistance to the alfalfa weevil**
- **Excellent honey production**
- **Good drought tolerance**
- **Extremely winterhardy and frost tolerant**
- **Fixes atmospheric Nitrogen**
- **Low phosphorus requirement**
- **Non-invasive species**

Plant Characteristics

- Grows to a height of 3 or more feet
 - Taller than alfalfa
- Stems appear course but are soft and very palatable
- Many leaflets per leaf
- Rose-pink flowers on spike like head called a raceme





Pollen collection is less injurious to honey bees than with alfalfa.

Seed Characteristics

- Large brown seeds are in single pods that remain intact during harvest and cleaning.
- Seed is larger than most common forage legumes.
- Dehulled sainfoin contains about 32,000seeds/lb
- 21,000 seeds per lb with hull on



Photo by Raina Spence

History and Variety Development of Sainfoin in North America

History

Introduced into the Northern Great Plains in the 1800s.

Variety Development

Variety	Year Released	Releasing Agency
Eski	1964	Montana State University
Remont	1971	Montana State University
Melrose	1972	Agriculture Canada
Renumex	1979	New Mexico State University
Nova	1980	Agriculture Canada

Newer Releases

- **Shoshone** developed by Dr. Fred Gray, University of Wyoming
- **Delaney** developed by Dr. Ron Delaney, University of Wyoming

WY-PX-94 was jointly released on January 11, 2005 as **Shoshone** by the University of Wyoming, Montana State University, and the USDA-Natural Resource Conservation Service.

Attributes of Shoshone Sainfoin

- **Tolerance to the Northern root-knot nematode.**
- **Resistant to the Alfalfa Stem Nematode.**
- **Higher yield than older varieties**

Foundation class seed was produced on the University of Wyoming Powell Research and Extension Center beginning in 2004.

Certified seed is available from seed producers in Wyoming and Montana.

SF-Laramie-73 was jointly released in 2007 as **Delaney** by the Montana State University, University of Wyoming,, and the USDA-Natural Resource Conservation Service.

Attributes of Delaney Sainfoin

- Reported higher yields than other varieties
- Best suited as a replacement for Remont
- Considered a multiple-cut cultivar

A small amount of Breeder/Foundation class seed was produced on the University of Wyoming Powell Research and Extension Center beginning in 2004.

Foundation Seed was planted in Montana in 2007. Should be available from MSU in 2008.



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Research and Extension Center
Powell, Wyoming**

Irrigated Site

Yield trials of Shoshone and Remont sainfoin at the University of Wyoming R&E Center at Powell, (irrigated)^a

Entry	Yield (T/A) (dry matter)			Total yield (T/A) (7 cuts)	Plants/ sq ft (2001)	Forage quality ^b (1999)		
	1997 (2 cuts)	1999 (2 cuts)	2001 (3 cuts)			CP	ADF	NDF
Shoshone	2.09	4.14	4.90	11.13	1.38	17.48	30.13	38.20
Remont	1.74	3.78	4.92	10.44	1.24	16.45	33.20	42.08
Shoshone+Manska	2.24	4.13	5.50	11.87	1.03	16.30	31.53	46.33
Remont+Manska	2.24	4.10	5.64	11.98	0.95	15.60	32.65	46.20
Spreador III		3.76				19.33	31.40	38.03
Average	2.08	3.98	5.24	11.30	1.15	17.03	31.78	42.17
LSD (0.10)		NS				2.33	NS	6.37
CV (%)		15.10				10.90	9.00	12.00

^a Plots were established in the spring of 1996. Values are the mean of 4 replicates.

^b 6-16-99. Sainfoin full bloom, alfalfa late bud CP = Crude Protein, ADF = Acid Detergent Fiber, NDF = Neutral Detergent Fiber.

Miscellaneous legume trial (irrigated), Bozeman, Montana (established April 21, 2000)

Entry	4 harvest years				
	2000 (1 cut)	2001 (2 cuts)	2002 (3 cuts)	2003 (2 cuts)	Total (8 cuts)
Delaney (SF-Laramie-73)	4.22	8.77	5.62	4.36	22.96
Shoshone (WY-PX-94)	4.17	8.24	4.86	4.43	21.96
Remont sainfoin	3.24	7.88	4.70	4.32	20.15
Nova sainfoin	4.15	7.38	4.11	4.35	19.99
Eski sainfoin	3.22	7.82	4.87	3.70	19.61
Shaw alfalfa	2.82	6.60	5.45	4.25	19.11
Forager alfalfa	2.98	6.50	5.55	4.05	19.08
Ladak 65 alfalfa	3.02	6.48	5.04	4.26	18.81
Empire birdsfoot trefoil	2.29	4.27	3.47	3.23	13.24
L2 Syn-1 birdsfoot trefoil	2.37	3.93	3.48	3.04	12.82
Tretana birdsfoot trefoil	2.39	3.70	3.64	2.89	12.62
Viking birdsfoot trefoil	2.08	4.06	3.70	2.73	12.57
Leo birdsfoot trefoil	2.24	3.87	2.67	2.48	11.26
Lutana cicer milkvetch	0.98	3.07	2.63	3.10	9.78
Windsor cicer milkvetch	0.75	3.07	2.50	2.83	9.15
Monarch cicer milkvetch	0.43	2.44	2.52	2.88	8.28
Mean	2.58	5.50	4.05	3.56	15.70
LSD .05	0.37	0.56	0.63	0.66	1.64
CV%	10.1	7.0	10.8	12.86	7.29



2007 Irrigated Forage Yield Trial of Sainfoin at the University of Wyoming, Powell R&E Center

Entry	Yield (T/A) Dry Matter	Forage quality ^b (2007)				
	2007 (August 6)	CP%	ADF%	NDF%	NDFD%	RFV
Shoshone	0.93	22.2	28.4	33.5	40	185
Delaney	0.93	18.3	32.0	36.1	39	165
Eski	0.83	20.8	27.5	29.6	41	212
Rocky Mnt Remont	0.82	20.7	28.2	30.4	40	205
Remont	0.93	22.4	28.1	31.8	40	196
Alfalfa	1.43	20.2	34.5	39.2	46	147
Sainfoin Average	0.89	20.7	29.8	33.4	41	180

^a Plots were established June 4, 2007.

^b CP = Crude Protein, ADF = Acid Detergent Fiber, NDF = Neutral Detergent Fiber, NDFD = Neutral Detergent Fiber Digestibility, RFV = Relative Feed Value.

2007 Irrigated Forage Yield Trial of Sainfoin at the University of Wyoming, Powell R&E Center

Entry	2007 Yield Tons/acre Dry Matter	2008 Yield Tons/acre Dry Matter			2008 Total	2yr Total
	8-6-07 ^a	6-18-08	8-1-08	10-1-08		
Shoshone	0.93	3.70	2.31	0.78	6.79	7.72
Delaney	0.93	3.19	2.28	1.12	6.59	7.52
Eski	0.83	3.78	2.26	0.65	6.70	7.52
Remont	0.93	3.73	2.17	0.70	6.60	7.54
Rocky Mnt Remont	0.82	3.65	2.21	0.67	6.53	7.34
Ranger Alfalfa	1.43	3.58	2.68	1.05	7.31	8.74
Sainfoin Average	0.89	3.61	2.25	0.78	6.64	7.53

^a Plots were established June 4, 2007.

2007 Irrigated Forage Yield Trial of Sainfoin at the University of Wyoming, Powell R&E Center

Entry	Yield (T/A) Dry Matter	Forage quality ^b (June 18, 2008)				
	6-18-08	CP%	ADF%	NDF%	TDN%	RFV
Shoshone	3.70	15.5	33.6	43.1	62.7	135.0
Delaney	3.19	15.7	34.0	42.2	62.3	138.0
Eski	3.78	17.0	35.1	43.3	61.2	132.0
Remont	3.73	18.9	31.7	41.4	64.7	144.0
Rocky Mnt Remont	3.65	16.7	34.2	44.5	62.1	130.0
Alfalfa	3.58	17.4	35.2	41.8	61.0	136.8
Sainfoin Average	3.61	16.8	33.7	42.9	62.6	135.6

^a Plots were established June 4, 2007.

^b CP = Crude Protein, ADF = Acid Detergent Fiber, NDF = Neutral Detergent Fiber, TDN = Total Digestible Nutrients, RFV = Relative Feed Value.

Establishment

- Best suited to soils that are neutral to slightly alkaline (pH 7.0 to 8.0)
- Prefers well drained soils
- Amend with adequate levels of P and K
- Uniform, firm seedbed
- Plant early in the spring
- Important to inoculate seed
 - Use rhizobium specific for Sainfoin

Establishment cont.

- Depth of $\frac{1}{2}$ to $\frac{3}{4}$ inch
 - Drills with depth bands work good
 - Sainfoin does not emerge from deep planting
- May be seeded as solid stand in 7-12 inch rows or in wide rows (22 in).
 - May be planted with grain drill
- Recommended seeding rates vary
 - Irrigated
 - 45 PLS/acre = 31 seeds/sqft
 - 25-30 PLS/acre = 10.5 – 12.6 seeds/linear row foot
 - Have established seed production fields on 22in rows with 10 lbs/acre

Establishment cont.

- The seedlings are vigorous but do not compete well with companion crops or weeds
- Plant pure stand or with grass mixture
 - Reduce sainfoin seeding rate by 1/3 w/ grass



Mike Killen in newly planted Foundation seed field in 2004.



Weed Management

- Most important during establishment year
 - After establishment year crop competes well with weeds
- Mowing or grazing
- Chemical options include:
 - Pre emergence (dormant treatment)
 - Post emergence

Labeled Chemical options

- Preplant
 - NA
- Pre-emergence (established fields)
 - Sencor, Kerb
- Post-emergence
 - Poast or Poast Plus
 - Select

Other ideas

- It has been reported that Sainfoin shows some resistance to Glyphosate at low rates (4-6 oz)
- Some herbicides used on Alfalfa have potential with Sainfoin

Sainfoin response to preplant and post herbicide treatments.

Treatments	Application		Sainfoin	
	Rate	Timing	Injury	Seed Yield
	oz/A	--	%	lb/A
Balan + Treflan	26 + 16	PPI	0	805
Balan + Eptam	26 + 32	PPI	0	855
Balan + Prowl H₂O	26 + 24	PPI	0	990
Balan + Outlook	26 + 14	PPI	0	850
Balan + Sonalan	26 + 32	PPI	0	995
Balan / Basagran	26 / 16	PPI / Post	3	800
Balan / Raptor + Nis	26 / 4	PPI / Post	0	800
Balan / Pursuit + Nis	26 / 3	PPI / Post	7	715
Balan / Basagran + Raptor + Nis	26 / 16+4	PPI / Post	0	800
Balan / Basagran + Pursuit + Nis	26 / 16+3	PPI / Post	10	721
Balan / Buctril	26 / 11	PPI / Post	5	785
Balan / Butyrac	26 / 16	PPI / Post	10	626
Balan / MCPA-amine	26 / 8	PPI / Post	15	630
Balan / Thistrol	26 / 16	PPI / Post	15	692
Balan	26	PPI	0	678

Nis; nonionic surfactant (Preference) at 0.25%. PPI; 4/26. Post; 6/29.



Irrigation Management

- Drought tolerant
- Deep rooted
- Does not like being wet for long periods
- Observed yellowing and stand loss in areas that hold water or around leaky irrigation gates

Observations

- Rapid spring growth
 - Two weeks earlier than alfalfa
- Very attractive to wildlife

Concerns

- Stand persistence?
- Poor growth if soil fertility is low
- Lygus bugs in seed production fields
- May lodge under high fertility and water

Seed Production

- Excellent Yields: 1000-1800 lbs/acre
- Shatters very easily
- Need to control Lygus bugs
- Good re-growth after seed harvest
- Potential for seed and forage crop in same year







Questions?



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