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Case Study:
Alternative Forage Crops and Cover

Cows graze a warm-season based forage crop mix on Foust Farms in Lake Co., 2016

Alternative forage crops, or cover crops are generally annual crops that provide forage for livestock (hay or grazing) as well as providing other soil building benefits. These crops can be utilized during hayland renovation cycles or at any time during a crop rotation. Often during renovations of hayland, barley or other small grains are planted. Alternative forage crops provide an additional opportunity for forage producers. Yields can be higher with diverse forage crops and grazing values can be significantly better than small grains. Benefits to the soil can be profound and can pay dividends for years to come.

Alternative forage crops offer flexibility with regards to seeding times, harvest methods (grazing or haying), costs, and goals. When planted as mixtures of numerous species, alternative forage mixes frequently contain as many as 3-10 different species in a single mix.

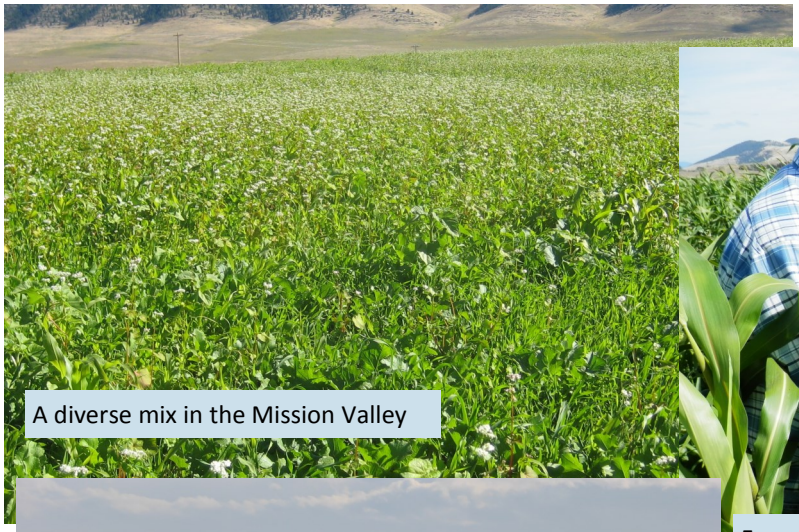
Cool season mix, Lake Co.

Using mixes can provide a wide range of benefits. First, mixes allow managers to accomplish many goals at once. For instance, adding deep-tillage radishes to a mix can help break deep compaction layers in soil. Adding legumes such as peas or vetches can add nitrogen back to soils and increase fertility. High biomass producers like sorghum, millets, and small grains can provide significant quantities of forage while at the same time rapidly building organic matter. Warm season crops like sorghum grass, sudan grass, millets, sunflowers, buckwheat can grow quickly during the dog-days of late July and August when other crops wither. Cool season brassicas like collard greens, kale, radishes, rape (canola) and turnips produce huge amounts of highly palatable forage in the spring and fall and can tolerate frosts better well to provide late-season grazing opportunities.

Mixes can afford lots of flexibility with regards to seeding dates. Cool season-based mixtures can be seeded in April and harvested in July or can be seeded later in the summer and grazed in the fall. Warm season mixes can be seeded in June and harvested in late summer or even be stockpiled for fall/winter grazing. Alternatively, a warm and cool season mix can often be planted after harvest of a cool season crop (like wheat or barley) in July/August to provide a high quality fall/winter feeding source. No matter what your goal or objective is, alternative forage crops and cover crops can fill a niche for producers looking to get increased value from their cropping cycles.

Case Study:

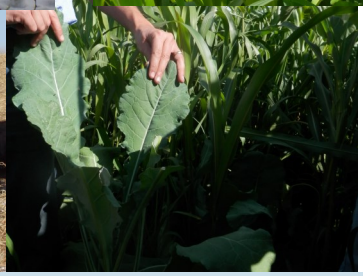
Alternative Forage Crops and Cover Crops Continued



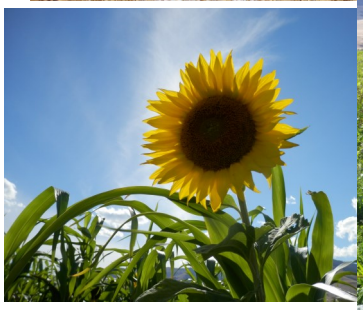
A diverse mix in the Mission Valley

Forage crop grown on Foust Farms, Lake Co. Grazed in the summer 2016

Winter grazing of cover crop in Montana.



Lake Co. prized brassicas: turnip, collard greens and radishes



Case Study:
Alternative Forage Crops and Cover Crops Continued

Cover Crop Grazing Tips

Grazing cover crops can provide significant benefits, but as with any forage, there are risks associated with grazing cover crops. Be mindful of toxicity risks associated with some forage species. Warm season grasses (sorghum, sudangrass and hybrids) carry prussic acid. Nitrates can be another concern with some cover crop species as well (small grains, millets and brassicas). Bloating from legumes should also be monitored if applicable. There are several ways to reduce toxicity risks, listed below.

- ***Use Mixes:*** The best way to avoid toxicity is to plant mixes of species in order to allow livestock to balance the intake quantities of different species.
- ***Manage Turn-in Times and Dates:*** Do not turn livestock into a cover crop field on an empty stomach as it can cause them to over-eat, increasing the risk of toxicity. Turn them in during the afternoon, on a full stomach if possible. Additionally, avoid turning livestock into cover crops that are stressed such as after a hard frost or following a prolonged drought. Stressed crops can cause nitrates and prussic acid levels to temporarily spike. Wait for 7—10 days after any stressing events to turn in livestock.
- ***Rotate Livestock!*** Rotating livestock provides multiple benefits: 1.) allows for better utilization of forage. Studies have shown that utilization can improve by >35% from rotating, 2.) prevents animals from 'high-grading' the stand and cherry picking preferred species or plant parts first which can cause rapid swings in animal nutritional intake, 3.) better distribution of manure and reduced compaction.
- ***Increase Livestock Densities:*** Higher stock densities increase competition between livestock. Stock will usually decrease their selectivity and eat a more balanced diet thus decreasing toxicity risks and improving nutritional intake. Use temporary fencing to rotate animals. Increasing stock densities and rotating animals through forage is the best we to maximize grazing efficiencies and animal performance while minimizing toxicity risks.

Forage Crops Ideas to Chew on

- ***Set a Goal or Objective Upfront:*** Use mixes to accomplish a set goal or objective such as building soils, feeding livestock, improving fertility, fighting weeds, reducing compaction, increasing diversity, building residue, providing nematode control, etc. Often you can accomplish two or more goals with the same mix!
- ***Warm-Season Mixes:*** Warm season mixes can produce significant biomass for grazing and building organic matter. Plant warm-season mixes in May/June when soil temperatures warm to >65 degrees @ 20-25 lbs./ac depending on species. Try putting in a warm season mix after harvesting a cool season crop. Plant them by mid-July for an excellent 2nd cropping option! They can often be grazed once and allowed to regrow for a 2nd grazing.
- ***Cool-Season Mixes:*** Plant cool-season based mixes in April/May and graze them in the summer or plant in early-mid August and graze them in the fall. Plant cool season mixes at a higher seeding rate than warm season mixes. Cool season mixes should be planted at 50-75 lbs./ac to maximize grazing values.
- ***Consider Double Cropping on Irrigated Fields.*** Plant a cool season grain or a mix in the fall or spring. Immediately after harvest seed a mix of warm and cool season species to provide late summer, fall or winter forage.

Case Study:
Alternative Forage Crops and Cover Crops Continued

Putting Together A Mix

Before designing a mix, first consider your goals and objectives. A good mix should contain between 3 and 10 species. For a mix that will be seeded in September or April and harvested in early summer use primarily cool season species. If a mix will be seeded in April but not harvested till August it might make sense to add some warm season plants that can take advantage of summer heat. A mix that is seeded in June or July and grazed in the summer and/or fall should include both warm and cool season species.

Generally the mix should contain grasses, broadleaf plants and legumes. Often a heavy annual grass component (50%-70%) is a good idea for biomass production. To increase diversity and nitrogen in the soil add legumes to the mix. For tillage/compaction breaking properties add radishes, collards, turnips and other brassicas or even sunflowers, which have deep tap roots. The sky is the limit and experimenting with different options is often necessary to find out what works best for you.

Tried and Tested Local Species: These species have all been seeded locally (in Lake County) and we know they work!

Cool Season Grasses	Cool Season Broadleaves	Cool Season Legumes	Warm Season Legumes	Warm Season Broadleaves	Warm Season Grasses
BARLEY	FORAGE COLLARDS	PEAS	CHICKPEA	SUNFLOWER	MILLET
OATS	KALE	VETCHES (Hairy or Common)	COWPEA	BUCKWHEAT	SORGHUM
WINTER or SPRING WHEAT	RADISH	LENTILS	SOYBEAN	CHICORY	SUDAN GRASS
CEREAL RYE	TURNIP	CRIMSON CLOVER	MUNG BEAN	SAFFLOWER	SORGHUM-SUDANGRASS
WINTER OR SPRING TRITICALE	RAPE (Canola)	FAVA BEAN			CORN
	PHACELIA				
	FLAX				

A mix of brassicas broadcast seeded into wheat stubble following harvest.

Case Study:

Alternative Forage Crops and Cover Crops Continued

Sample Mixes:

To maximize grazing seed at least 150% of the full rate. Mixes should be seeded between 120%-170% of the full rate and a seed rate of 750,000 to 1,100,000 seeds/ac depending on the species you are planting.

Sample Cool Season Mix

For Cool Season-based mixes plant between 50-75 lbs./ac (between 130%-180% of the full rate). Should be seeded in spring or late summer. The species listed below are excellent to use in a combination.

Plant Species	LBS PLS/ Acre (pure stand)	Percent of Mix-ture	LBS PLS/Acre Needed in Mix-ture
Peas - forage variety preferred	64	15%	9.6
Vetch - common or hairy	20	10%	2
Oats - black or rockford preferred	100	18%	18
Barley - forage variety preferred	80	18%	14.4
Triticale	80	18%	14.4
Rapeseed (canola)	6	10%	0.6
Collards - Impact Forage	9	15%	1.35
Turnip - Grazing variety	9	10%	0.9
Radish - Nitro or Grazing variety	9	10%	0.9
Sunflower	9	10%	0.9
Phacelia - annual variety	13	10%	1.3
TOTAL		**154%**	**65.05**

Sample Warm Season-based Mix

For Warm Season-based mixes plant between 20-25 lbs./ac (between 130%-180% of the full rate). Seed when soil temps > 65 degrees (June thru July). The species listed below are excellent to use in a combination.

Plant Species	LBS PLS/ Acre (pure stand)	Percent of Mix-ture	LBS PLS/Acre Needed in Mix
Peas - forage peas	53	10%	5.3
Vetch - common or hairy	20	10%	2
German Millet	16	10%	1.6
Pearl Millet	16	15%	2.4
Sorgum-Sudan - BMR type preferred	25	18%	4.5
Sorgum - forage type, BRM type preferred	7	18%	1.26
Corn - forage variety, BRM type preferred	27	12%	3.24
Collards - Impact Forage	9	10%	0.9
Turnip - Grazing variety	9	10%	0.9
Radish - Nitro or Grazing variety	9	10%	0.9
Sunflower	9	10%	0.9
Phacelia	13	10%	1.3
TOTAL		**143%**	**25.2**

Case Study:

Alternative Forage Crops and Cover Crops Continued

Planting After Small Grain Harvest

Using a forage crop after small grain harvest on irrigated cropland can provide significant benefits. After small grain harvest immediately seed a mix of warm season and cool season plants. It is strongly recommended that the forage crop be irrigated. Allow the forage crop to grow and graze it anytime between late October and December. It is not uncommon to produce over 2 tons/acre of additional production with these mixes. Seeding can be done via no-till into existing stubble or it can be broadcast and harrowed to aid in establishment.

Sample Cool Season/Warm Season Mix

Plant a combination of warm season and cool season plants to maximize production. Mix should include at least 3 species. At a minimum we recommend you plant 1. millet, sorgum, sudan or sorgum-sudan 2. Forage Collards, radishs and/or turnips and 3. a small grain.

Plant Species	LBS PLS/ Acre (pure stand)	Percent of Mixture	LBS PLS/Acre Needed in Mix
Peas - forage peas	53	10%	5.3
Sorgum-Sudan - BMR type preferred	25	18%	4.5
Oats	100	30%	30
Collards - Impact Forage	9	20%	1.8
Turnip - Grazing variety	9	10%	0.9
Radish - Nitro or Grazing variety	9	10%	0.9
Sunflower	9	10%	0.9
TOTAL		**108%**	**44.3**

Lake County Forage Crop: Planted immediately after small grain harvest in August via no-till into standing stubble. Yielded 2 tons/acre of dry-weight forage by mid-October. Even heavy winter snow did not deter grazing.

Notice the success in no-tilling into thick standing stubble

Winter grazing of cover crop; reduced winter feeding bill.