Cropping options for limited water supplies in Northeast Colorado, 2003

Producers faced with reduced water supplies in northeast Colorado have four possible management options: 1) reduce total acreage of irrigated crops, 2) grow traditional crops with limited irrigation water applied over the entire field, 3) grow crops that require less water because of a shorter growing season, or 4) switch from irrigated to dryland crop production. The first option requires producers to establish a crop cover on the land not irrigated to prevent soil erosion and the problem of blowing dust. The decision to change crop rotations is difficult and is further complicated by federal farm programs and crop insurance rules. Producers should check with their crop insurance agent if there is a question on any of these options and how it might affect their policy.

Crop Options

Some crops can be effectively grown under limited irrigation in Northeast Colorado, some can be grown dryland, and some are not economically feasible without a full supply of irrigation water. Optimum production of dryland crops in our region occurs when a full soil moisture profile is present at the onset of the season. But most dryland crops can be grown successfully with limited available soil moisture when normal precipitation is received. Planting time soil moisture in the seeding depth needs to be sufficient for germination and stand establishment.

For many producers, switching to limited irrigated or to dryland forage production is the best option for salvaging a marketable commodity and maintaining soil cover. If some irrigation water is available, using that limited water to produce a good first cutting from existing alfalfa fields or to maintain a hard-earned market share of a full-irrigated specialty crop such as onions, carrots, beets, or sweet corn on reduced acres may be the best approach. However, assurances that water will be available through the entire production season will be needed for this to be a justifiable option.

As the season progresses, crop options become increasingly limited and cool season crops such as wheat, oats or barley are replaced by warm-season crops such as millet or sorghum. Table 1 provides a list of crop options. Table 1 provides the optimum dates for grain and forage production and the last practical planting date to achieve cover in this area.

Producers faced with the prospect of long term dry-up of irrigated lands may want to plant a cover crop this year, then follow-up with a dormant season planting of a perennial dryland grass mix next November through February or a spring planting of perennial grasses during the period from March to mid-May. Alternatively, a no-till dryland annual forage crop such as hay millet or sorghum-sudangrass may be a better fit if harvested forage is more important in your long term plans than permanent pasture. Crop residues left on the soil surface after harvest varies greatly among crops, harvest methods and other management choices. If crops are cut for forage, set the cutting height at a minimum of 4 inches to retain adequate soil cover. Leaving 2 or more rows uncut out of every 8 to 10 rows cut is an additional option to reduce wind erosion and capture snow moisture.

Table 1: Summary of potential field crops for dryland or limited irrigation in Northeast Colorado.

Crop	Seeding rate (lbs/acre)	Usual planting date	Last date for cover crop	Seeding soil cover (inches)	Planting to harvest (days)	Yield[1] potential grain	Yield potential forage	Potential residue/cover	Drought tolerance	Comments
						unit/acre	tons/acre			
Barley --spring	60-90	2/20 - 3/31	5/10	1-2	100-120	20-80 bu	3-5	med-high	Fair	grain, forage, cover, grazing
Beans -- pinto	60-70	5/25 - 6/25	----	1-3	90-110	15-40 bu		unacceptable[2]	Little	limited irrigation only
Corn -- grain	8-18	4/15 - 5/20	6/10	1-3	100-140	20-200 bu		low[3]	Poor	dryland must be notill
Corn -- forage	8-18	4/15 - 5/20	6/10	1-3	85-110		5-35	unacceptable	Poor	
Millet -- proso	6-20	5/15 - 6/30	7/30	0.5-.75	70-90	5-40 bu		med-high	Good	grain or cover
Millet -- foxtail	4-12	5/15 - 6/30	7/30	0.5-.75	50-60		1-4	low-forage	Fair	forage, cover, grazing
Millet -- pearl forage	5-15	5/25 - 6/15	7/15	0.5	40 to 45 for forage	may not mature	1-3	low-forage	Good	forage, cover, grazing
Oats -- spring	50-90	2/20 - 3/30	5/10	1-2	100-120		1-5	med	Poor	forage, cover, grazing
Safflower	15-20	4/15 - 5/20	----	0.75-1.5	120-150	400 - 1,500 lbs		low	Good	grain
Sorghum -- grain	2-8[4]	5/5 - 6/10	6/30	0.75-1	90-130	30-80 bu		med-high	Good	grain or cover
Sorghum --	4-8	5/15 -	6/3	0.75-	90-		5-20	med-high	Good	forage,

forage		6/10	0	1	100					cover, grazing, high prussic acid potential
Sorghum/Sudan grass	8-20	5/15 - 7/1	7/15	0.75-1	40 to 45 for forage		3-10	high	Good	forage, cover, grazing; moderate prussic acid potential
Sunflower -- oil	3-7	5/10 - 7/1	----	1-2	90-120	600 - 2,500 lbs		very low	Good	Notill preferred
Triticale -- winter	50-80	8/30 - 9/30	10/15	1-2			3-5	high	Fair	grain, forage, cover, grazing
Wheat -- spring	50-70	2/20 - 3/30	5/10	1-2	110-120		3-5	high	Fair	forage, cover, grazing
Wheat -- winter	35-45	9/10 - 9/25	10/15	1-2		15-80	3-5	high	Fair	grain, forage, cover, grazing

[1] Potential yields vary widely due to precipitation & irrigation potential.
[2] Unacceptable amount of residue or ground cover for emergency cover situations
[3] Erosion prevention potential can be increased by leaving two rows unharvested every 8-16 rows depending upon crop height, corn is not accepted by FSA as cover crop
[4] Grain sorghum may have trouble maturing when grown in areas higher than 4,500 feet of elevation

Tillage and Residue Management

Dryland and limited irrigation systems require that producers capture and store every possible inch of precipitation. Residue management can have a significant impact upon increasing soil water capture and storage with the additional benefit of decreasing soil erosion.

Producers faced with converting previously irrigated acres to dryland production must immediately switch to no-till practices in order to conserve soil moisture for stand establishment. Many small seeded crops will not be successful where seedbed moisture has been lost by conventional tillage practices. Weed control under reduced tillage practices will require a switch from tillage to herbicides. Conversion of previously irrigated corn ground to dryland corn production is not usually a viable option in northeast Colorado for the reasons mentioned above.

Considerations for Limited Irrigation

Producers can make some adjustments to continue growing irrigated crops and compensate for reduced surface water allocations or loss of wells. Fields may be split and planted to different crops to spread the irrigation season over a greater time period, but on fewer acres irrigated at any one time. The advantage of irrigating fewer acres at any one point in time is that peak ET demand of the crop can be better met with the reduced amount of water.

Another option is to plant the entire field to a single crop and irrigate to maintain soil moisture at or near field capacity early in the growing season when the system capacity exceeds ET. When the ET for the crop is greater than the capacity of the system, plants will use stored soil moisture to maintain ET. This strategy maintains soil moisture for when the crop reaches the most water stress sensitive period, usually the reproductive growth stage.

Different crops have different water use requirements, under the same weather conditions. The water requirements listed in Table 2 below are net crop water use, the amount that the crop will consume (not counting water losses such as deep percolation and runoff) in an average year, given soil moisture levels do not fall below critical levels.

Table 2. Estimated seasonal water requirement (in inches) under full irrigation in Northeastern Colorado.

	Greeley	Longmont	Sterling	Wray
	---------- inches / season ----------			
Alfalfa	31.6	30.9	35.2	35.2
Grass hay/pasture	26.6	26.2	28.0	30.9
Dry beans	18.4	15.8	18.7	18.7
Corn, grain		21.7		25.4
Corn, silage	21.7	19.7	20.3	
Corn, sweet	22.7			
Potatoes	28.1			
Small vegetables	17.7			
Sorghum, grain	19.5			21.0
Spring grains		11.4	14.3	15.2
Sugarbeets	29.3	25.5	30.0	30.0
Wheat, winter	16.4	18.5	18.5	

Cover Crops

In some situations, simply establishing a cover crop on bare fields may be the best alternative. Small grains such as oats, wheat, triticale, or millet will offer protection from erosion with little input costs. Bin run seed is acceptable for this situation, provided that the seed is weed free. Growers should not plan on a harvestable grain yield with cover crops. Optimally, the crop should be swathed or mowed at head eruption to just prior to flowering. The mowing/swathing

device should be set to cut at the joint height or higher to eliminate seed production that could become weed problems from subsequent crops. For fields where pests such as nematodes are a problem, oil seed radishes are a possible cover crop when drilled at close spacing.

Resources

Web:
CSU Cooperative Extension Crop Production Fact Sheets
http://www.ext.colostate.edu/pubs/crops/pubcrop.html#prod

University of Nebraska Fact Sheets
http://www.ianr.unl.edu/pubs/

From the Ground Up Agronomy Newsletters
http://www.colostate.edu/Depts/SoilCrop/extension/Newsletters/news.html

Contacts:
Cover crops - Jerry Alldredge (970) 356-4000 x 4465

Forages - Bruce Bosley (970) 522-3200 x 3200
Limited Irrigation - Joel Schneekloth (970) 345-0508
Millets - Dr. Gary Peterson (970) 491-6804
Sorghum - Dan Smith (970) 491-6371
Sunflowers/safflower - Ron Meyer (719) 346-5571
Wheat - Dr. Jerry Johnson (970) 491-1454