# Utilizing Cover Crops to Stabilize and Reclaim Previously Irrigated Cropland

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## Situation

➢Drought, competition, urban growth, declining ground water levels, and evolving water laws and policy are contributing to decreasing supplies of irrigation water available to farmers in the semi-arid to arid Western US.

➢Colorado population is expected to increase by 2.8 million by 2030. Greater competition for water is expected resulting in large decreases in irrigated acreage.

➢Along the Front Range of Colorado, irrigated acreage may decrease by 156,000 to 298,000 acres of highly productive cropland by 2030.

➢Farmers are often forced to temporarily or permanently dry-up and fallow previously irrigated land.

➢ Abruptly halting irrigated crop production on fields that have been intensively managed results in negative consequences: Residual soil nutrients threaten water quality; weed infestations compete with perennial grass establishment; wind and water erosion can be significant; and compaction and salinity can initially limit the non-irrigated crop and restoration planting choices.

➢ Utilizing cover crops may bridge the transition from irrigated production to dryland or grassland production or provide an interim solution to weed and soil management while waiting for irrigation water restoration.

## Objective

Colorado State University Extension is establishing cover crop recommendations for producers who need to assume dryland production or establish grasses into formerly irrigated fields.

| Plot | Planting Sequence | | | | 2009 Plans |
|---|---|---|---|---|---|
| 1 | rep 1 | Barley | Triticale | | Plant Sudan |
| 2 | | Sorghum | Triticale | Millet | Triticale | Harvest Biomass |
| 3 | | Sudan | Winter Wheat | Sorghum | Pubescent Wheat Grass | Monitor Grass Production |
| 4 | | Fallow | Winter Wheat | | | Plant Sorghum |
| 5 | | Millet | Fallow | Sudan | | Plant Warm Season Grass |

## Site History and Characteristics

➢Last crop was Sugar Beets in 2005

➢20 tons manure applied fall 2005 anticipating spring 2006 corn planting.

➢Irrigation well curtailment, mandated by state policy occurred in Spring 2006.

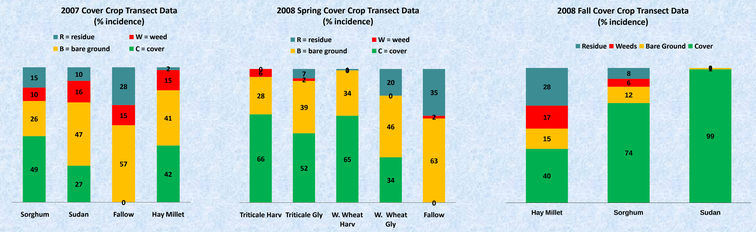
➢Soil Type: Vona Sandy Loam.

➢Location: central Weld County, Colorado.

➢Avg annual precip: 12.2 in. seasonal Apr – Sep: 9.1 in.

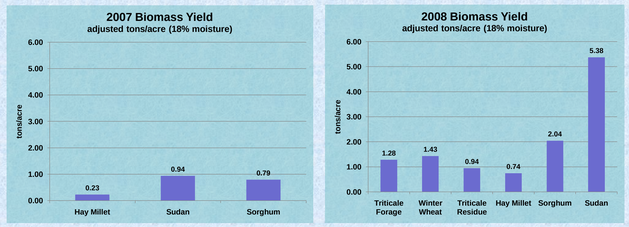
➢Cover crops no-till planted – no tillage occurring with project.

## Ground Cover, Residue and Weed Suppression



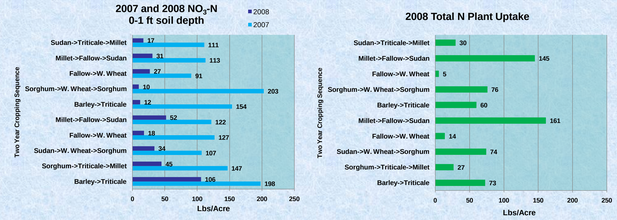

➢Transect data was collected a crop full growth prior to harvest.
➢Trend illustrated by plots shows increases in sudan and sorghum cover crop establishment with subsequent decreases in weed population and incidence of bare soil.

## Cover Crop Biomass Production




➢Crop harvest occurred when individual crops approached maturity.
➢Samples were analyzed for total N to determine nitrogen uptake.
➢Biomass production was influenced by timing and amount of precipitation events.

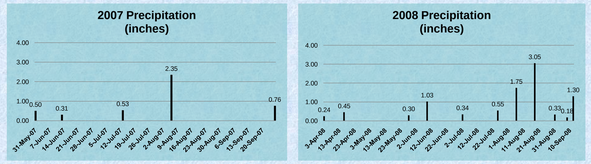
## Soil Nitrate Uptake and Removal




➢Surface horizon (0-1 ft) $NO_3$-N reductions occurred.
➢Nitrogen uptake occurred accounting for some of these reductions,$NO_3$-N leaching is also possible due to rainfall events in 2008 and coarse textured soil.
➢ Fallow -> Winter Wheat cropping did not account for reductions to surface horizon $NO_3$-N via total N uptake.
➢Nitrogen uptake is greater in higher yielding crops in terms of biomass production.

High weed infestation two years following irrigation well curtailment. This is a typical scene in many formerly irrigated fields due to their abandonment.

## Precipitation




**Seasonal totals:**
➢**2007 = 4.5 inches**
➢**2008 = 9.5 inches**

Successful plantings of cover crops are possible in dried up farmland. Cover crops provide nutrient uptake reducing residual soil N thus lowering $NO_3$ leaching potential.

**Plot 5: 19MAY08**
➢Hay millet residue from 2007 crop harvested as forage.
➢Triticale on right, Winter Wheat on left.

**Plot 5: 17JUN08**
➢Sudan, no-till seeded 10JUN08.
➢1.03 inches of rain on 12JUN08.

**Plot 5: 22JUL08**
➢Sudan developing.
➢12 Lbs/Acre seeding rate.
➢.34 inches of rain on 3JUL08.

**Plot 5: 25AUG08**
➢Sudan growth following 4.8 inches of rain in August.

**Plot 5: 30SEP08**
➢ Sudan Harvest.
➢ 5.4 Tons/Acre.

## Summary

Initial results from this work show cover crops provide a viable source of soil cover and residue to reduce erosion, suppress weeds and uptake nutrients for restoration of previously irrigated land. Weed suppression allowed proportionate increases in cover crop biomass with decreases in weed seed and biomass production. This work has generated much interest from the cooperating farmer and surrounding land owners.

**Future Plans:**

➢2009 season plans include establishment of summer forage crops, grain and possibly oil seed crops, warm season grasses and fall planting of cool season native grasses.

➢Our primary goal is to provide cover crop recommendations for producers who need to assume dryland production or establish grasses into formerly irrigated fields to mitigate soil erosion, and soil nutrient loss thereby protecting our water resources.

➢Collaboration with area farmers, county extension, NRCS, and conservation districts is expected to increase via additional site trials and/or expansion of current site.

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**Sources:**
Colorado Department of Local Affairs Demography Section
Colorado's Decision Support Systems and Basin Roundtable/Basin Advisor input