



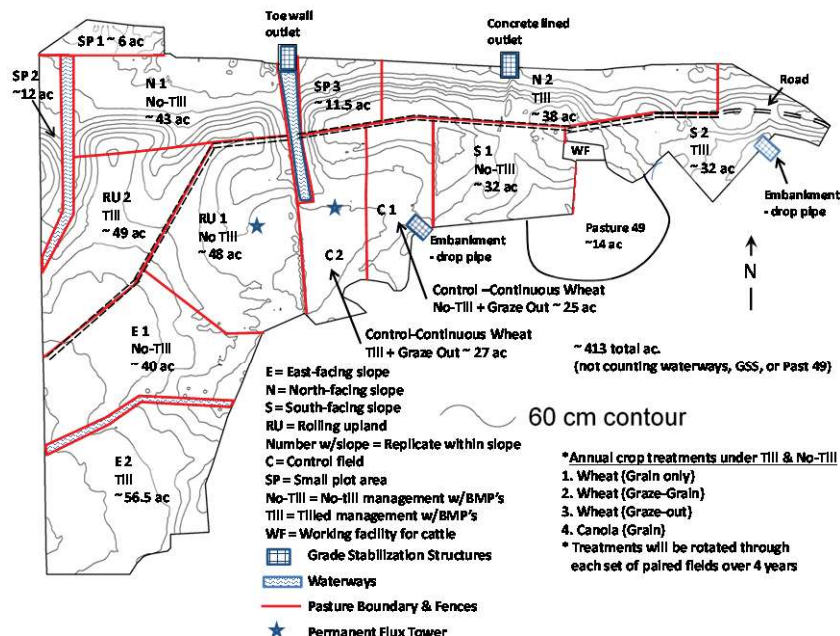
United States Department of Agriculture Agricultural Research Service

Integrated Wheat-Canola-Cattle Production System: Research Field Site Overview

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Rationale: Production of winter wheat is an important part of cropping systems in the southern Great Plains, and is typically used for both pasture and as grain. In recent years, interest has increased in using winter canola in rotation with winter wheat. Wheat-canola crop rotations increase soil fertility, reduce incidence of wheat disease and insect pests, improve weed control, increase wheat grain yields following canola, and improve farm income from selling a more diverse range of products (wheat, canola, grazing cattle). Interest has also increased in no-till or minimum-tillage farming to improve production and reduce negative impacts on the environment. Proposed benefits from no-till/minimum-tillage systems include more effective control of wind and water erosion, improved water infiltration retention into soil, less runoff, long-term improvement in soil properties, decreased compaction, and fuel savings.



In recent years, mitigating greenhouse gasses (methane and carbon dioxide) generated by agricultural practices has become important. Dynamic weather conditions in the southern Great Plains necessitate research to better understand the impacts of agricultural production systems on environmental, water, and air quality factors. Knowledge will help refine management of on-farm resources to increase production potential, while improving resilience and minimizing environmental impacts.

Objective: Establish field-scale watersheds to evaluate environmental and atmospheric effects from integrated production of wheat, canola, and beef cattle under till and no-till farming practices.

What we did: We established a ~450-acre wheat farm to compare tillage and no-tillage/minimum tillage farming practices. Using soil type and slope, paired fields (till and no-till) were mapped. Each field (~ 40 to 50 acres) is an individual watershed. Managed waterways, grass buffer strips, and erosion-control structures for water control were developed and installed with USDA-NRCS specialists. Specific equipment for collection of water samples and research data from individual field-scale pastures allow for computation of water budgets and water-use efficiency in each field.

There are also control fields (till and no-till) of continuous wheat for graze-out by stocker cattle (Nov through May) year after year. Canola and beef cattle will be included in the crop rotation on the other pastures. Rotational treatments each year on the paired fields are: 1) Wheat (Grain; No Graze); 2) Wheat (Graze:Grain; grazed Nov through ~ Feb); 3) Wheat (Graze-out; No Grain); and 4) Canola (Grain; No Graze). In the field crop rotation schedule each year (below), graze-out wheat is followed by canola, and canola is followed by wheat for grain. Canola does not germinate well in heavy plant residues, and canola may benefit wheat for grain by providing pest/weed control.

No-Till and Till Fields:
 RU= Rolling Upland
 E = East-facing slope
 S = South-facing slope
 N = North-facing slope

Year	Time	No-Till				Till			
		RU-1	E-1	S-1	N-1	RU-2	E2	S-2	N-2
2016	Fall	Canola	Wheat	Wheat	Wheat	Canola	Wheat	Wheat	Wheat
2016	Fall	No Graze	No Graze	Graze	Graze	No Graze	No Graze	Graze	Graze
2017	Spring	No Graze	No Graze	Off	Grazeout	No Graze	No Graze	Off	Grazeout
2017	Summer	Grain	Grain	Grain	Grain	Grain	Grain	Grain	Grain
2017	Fall	Wheat	Wheat	Wheat	Canola	Wheat	Wheat	Wheat	Canola
2017	Fall	No Graze	Graze	Graze	No Graze	No Graze	Graze	Graze	No Graze
2018	Spring	No Graze	Off	Grazeout	No Graze	No Graze	Off	Grazeout	No Graze
2018	Summer	Grain	Grain	Grain	Grain	Grain	Grain	Grain	Grain
2018	Fall	Wheat	Wheat	Canola	Wheat	Wheat	Wheat	Canola	Wheat
2018	Fall	Graze	Graze	No Graze	No Graze	Graze	Graze	No Graze	No Graze
2019	Spring	Off	Grazeout	No Graze	No Graze	Off	Grazeout	No Graze	No Graze
2019	Summer	Grain	Grain	Grain	Grain	Grain	Grain	Grain	Grain
2019	Fall	Wheat	Canola	Wheat	Wheat	Wheat	Canola	Wheat	Wheat
2019	Fall	Graze	No Graze	No Graze	Graze	Graze	No Graze	No Graze	Graze
2020	Spring	Grazeout	No Graze	No Graze	Off	Grazeout	No Graze	No Graze	Off
2020	Summer		Grain	Grain	Grain		Grain	Grain	Grain

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