

CROP MANAGEMENT ON THE PARKLAND SOILS OF SASKATCHEWAN

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A review of data tabulated by the Saskatchewan Wheat Pool indicates that the average yields in the Parkbelt area of Saskatchewan over the past nine years were approximately as follows:

Approximate Average Yields (Crop Districts 5-9)
1965 - 1973

Crop	Yield bu/ac	Range in Yield
Wheat	25	21 (1967) to 31 (1966)
Barley	40	30 (1967) to 46 (1971)
Flax	14	11 (1967) to 17 (1970)
Rapeseed	18	16 (1973) to 20 (1966)

With improved cropping practises and improved incentives for increased production I think it should be possible to increase the yields by at least 10 percent if the growing conditions are normal and if the required inputs are available.

Improved crop management is one way to improve these yields. Good management means knowing what to do and where, how and when to do it. It means putting all the best production technology together to produce maximum crop yields over an extended period of time.

There are a range of soils in northern Saskatchewan and a wide variety of crops that can be grown. Each of these soils are associated with a specific set of climatic conditions and the production of each crop requires special consideration.

Soil erosion from both wind and water is a problem on most of the soils in the area. If the production capacity of these soils is to be

maintained cropping systems must be used that keep soil erosion to a minimum. This usually means a system that will attempt to maintain a protective cover of plant residue on the soil. On summerfallow land this can be enhanced by using tillage equipment that will help to maintain the surface trash cover (cultivators, blades and rod weeders) and by substituting some of the tillage required for weed control with herbicides. The results of trials conducted at Melfort for a number of years in a two year rotation indicate that yields can be maintained and weeds controlled when some of the tillage is replaced with herbicides.

Dates of Starting Tillage on Fallow - Melfort

Date	Yield lb/ac	NO ₃	P
	9 yr av	5 yr av ppm	5 yr av ppm
Fall	3237	9.4	15.4
May 15	3249	8.5	15.6
June 15	3275	9.8	15.6
July 15	3230	7.9	15.6
Fall + July 1	3251	9.2	16.6

Note - Broadleaf weeds controlled with 2,4-D prior to tillage.

Tillage and Chemicals for Fallow - Melfort

Treatments	Yield lb/ac 8 yr av	Soil Analysis fall ppm	
		NO ₃ (0-2') 6 yr av	P (0-6") 4 yr av
1) Herbicides	3345	14	30
2) Normal tillage	3247	12	26
3) Tilled once*	3354	12	27
4) Tilled twice*	3327	14	30
5) Tilled 3 times*	3390	13	28

* Treatments supplemented with herbicides for weed control as necessary.

Improved summerfallow methods may not, in themselves, increase yields but they will maintain the soil in a more productive state for future generations and will often improve the results from other good management practises.

Cropping systems that utilize a wide range of crops and reduce the acreage in bare summerfallow have long been shown to improve the productive capacity of the Parkland Soils. Rotations that include annual grain and perennial forage crops are beneficial throughout the area and especially on the Grey-Wooded Soils that are low in organic matter. The soil benefits as well as increased returns per acre accruing from growing grasses and legumes on a regular basis have been demonstrated on many of these soils. The following data indicates the results of recent crop rotation tests conducted by the Melfort Research Station.

Crop Rotation Studies Northeastern Saskatchewan
Net Return \$/Ac

Site	Melfort	Archerwill	Somme
Soil Type	Msic	Wvl	Tic
Term of Study	15 yr	20 yr	17 yr
Rotation			
Continuous Wheat	15.60		
2 - Year	28.48	16.03	
3 - Year	35.44	16.60	35.52
6 - Year	38.37	27.17	45.13

Note - Crop Value, wheat 3.5 and hay 2.0 cents/lb.
Costs - Fertilizer 10¢/lb of nutrient and
1973 Production Costs.

Rotations - Continuous Wheat; 2-year: fallow, wheat; 3-year:
fallow, wheat, wheat; 6-year: fallow, wheat, wheat,
hay, hay, wheat at Melfort and fallow, wheat, hay,
hay, wheat, wheat at Archerwill and Somme.

If the production costs are increased by 25% over those recorded in 1973 and wheat was increased in value from 3.5 to 7.5 cents per pound these net returns would increase as follows:

Crop Rotation Studies Northeastern Saskatchewan
Net Returns, \$/Rotation Acre

Site	Melfort	Archerwill	Somme
Soil Type	Msic	Wvl	Tic
Term of Study	15 yr	20 yr	17 yr
Rotation			
Continuous Wheat	64.82		
2 - year	73.70	47.06	
3 - year	91.12	52.38	84.43
6 - year	77.47	57.40	87.56

Note - Crop Values, Wheat 7.5 and Hay 2.0 cents/lb.
Production Costs - 125% of 1973 Costs.

Rotations - Continuous Wheat; 2-year:fallow, wheat; 3-year:
fallow, wheat, wheat; 6-year:fallow, wheat, wheat,
hay, hay, wheat at Melfort and fallow, wheat, hay,
hay, wheat, wheat at Archerwill and Somme.

Soil test data on these studies showed that the nitrogen content of the soil was generally higher on fields in the longer term grain forage rotations.

Soil Test Data Rotation Studies Melfort Area

Rotation	Fallow (p.p.m.)				Stubble (p.p.m.)			
	Melfort		Somme		Melfort		Somme	
	NO ₃	P	NO ₃	P	NO ₃	P	NO ₃	P
	(0-2')	(0-6")	(0-2')	(0-6")	(0-2')	(0-6")	(0-2')	(0-6")
	9 yr av	8 yr av	7 yr av		8 yr av		7 yr av.	
Continuous					3.4	10.0		
2 - year	8.8	13.0			--	--		
3 - year	9.6	12.5	6.3	10.0	4.1	11.0	2.1	10.2
6 - year	12.8	8.0	8.3	9.1	6.5	9.5	6.4	7.2

In these studies comparable fields in the grain forage rotation produced grain with slightly higher protein content (.4% on fallow and .6% on stubble on a four year average at Melfort and .5% on fallow and .7% on stubble on a four year average at Somme) than fields in the 3-year straight grain rotation.

Varieties. It is important that the most up-to-date varieties of good seed be used in cropping programs. Some seed of varieties of grain that are out-dated and some poor quality seed is still being planted in the area.

Fertilizers. It is also important for maximum production that all crops in the rotation be adequately fertilized. Results of trials have shown that in the Parkland area a good increase in production can be obtained with adequate nitrogen and phosphorus fertilizer. With more stubble crop being considered this year and the fact that many stubble fields are low in nitrogen it is important that farmers get their soils tested and make arrangements for adding the required nutrients. Fertilizer often enhances the results of other good management and weed control practises by producing a more competitive crop stand.

The Effect of Fertilizer and Rotations on Yield
(6-year average) Melfort

	Yield lb/ac Wheat					
	Fallow		Stubble		Sod Fallow	
	Check	Fert.	Check	Fert.	Check	Fert.
1 yr. cont. wheat	--	--	1290	1813	--	--
3 yr. fallow, wheat, wheat	2725	3008	2264	2608	--	--
6 yr. fallow, wheat, wheat, hay, hay, wheat	2651	3067	2124	2500	2188	2751

Weed Control. Growing weeds can cost the agricultural industry a tremendous amount of money. Most farmers have weed problems many of these can be controlled with properly applied herbicide treatments. If they are controlled the result will be higher yields and less dockage for the farmer. It has been stated that much of the cultivated acreage in northeastern Saskatchewan is infested with wild oats. If these are not controlled they can cause a serious reduction in crop yields.

Stubble Cropping. Yields of stubble crops can be improved on many farms by more careful management of the trash, better fertilization of the crop and better weed control. Each stubble field should be managed so that the crop can be planted through the trash cover into a firm moist weed free seed bed at a shallow uniform depth. To achieve this it is advisable to have the trash uniformly distributed over the soil surface. This can be facilitated by swathing the previous crop as high as possible and still support the swath, by using a straw chopper and spreader on the combine and by harrowing the

the trash with self-cleaning harrows. The harrowing operation is best done at an angle to the combine rows on a dry day. Weeds must be controlled. Spraying after harvest should be considered for perennial and winter annual weed control. Fall tillage should be used where necessary to reduce the trash, control some weeds and help prepare the field for herbicide incorporation and seeding. Stubble land will yield best under many conditions if it is seeded as soon as it is fit to work, with a minimum amount of preseeding tillage. Preseeding tillage during dry weather often dries out the surface and delays the germination. Seeding cereals with ^{the}/discer or a once-over tillage and seeding machine will reduce the cost and often improve the yield. This is borne out by the results of tests conducted at Melfort and Brandon. (Can. J. Agric. Eng. Vol 11, No. 2 1969). In these studies at Melfort wheat, barley and flax have generally produced better returns per acre than rapeseed on stubble. This may be due to the difficulty in preparing a good seed bed in heavy trash and controlling weeds in rapeseed.

Cropping Sod. If grass sod is to be cropped it is important that it be broken early, usually after a hay crop has been removed. The sod should be given a good partial fallow so that it is possible to prepare a firm level, weed and grass free seed bed. Implements such as the moldboard plow, rototiller and heavy disc as well as the cultivator are useful in preparing a good partial fallow. Crops such as flax, oats and wheat perform well on sod fallow.

Cropping Summerfallow. The results of trials at Melfort and elsewhere show that if weeds are controlled fallow land usually produces best if it is seeded as soon as the land is fit to work with a minimum of pre-seeding tillage. The land should be prepared so that the seed can be placed into a firm moist level, weed free seed bed. The results of studies at Melfort and

Brandon showed that the press drill and discer with a good packing attachment were effective machines for seeding summerfallow. (Can. J Agric. Eng. Vol. 9 1967).

Post seeding tillage is not generally beneficial from a yield standpoint alone but may be useful for weed control, leveling and packing the field.

The Effect of Post Seeding Tillage on Fallow Melfort

Treatment	Yield, Wheat lb/ac	Surface Soil Particles % less than 1 mm
None	1320	46
Harrow	1314	50
Rodweed*	1434	53

* Rodweeded one week after seeding (few wild oats in test area).

Seed Placement. Is probably one of the most important factors to be considered for producing rapid germination and good crop stands that will compete with weeds for maximum production. The seeds of most crops should be placed into firm, moist soil less than 3 inches deep.

I feel that careful attention to these and other good management practises could result in a considerable increase in the average yield of crops in the Parkbelt area of Saskatchewan.

DISCUSSION OF KEN BOWREN'S PAPER ENTITLED: "CROP MANAGEMENT
ON THE PARKLAND SOILS OF SASKATCHEWAN"

Question: In your hay rotation how was the hay seeded, with
a nurse crop or was it seeded by itself?

Ken Bowren: I will get into an argument with Art if I start
talking about seeding hay, but in our rotations, we usually
seed our hay down with a cover crop, either on summerfallow
or on stubble. It depends a little bit on what you're
more concerned about here, if you want to get maximum return
from your land and you're using the forage mainly for soil
improvement you seed with a nurse crop; if you want to get
maximum yield from the hay, then it is better not to seed
with a nurse crop. If you are not going to seed with a
nurse crop it is much more difficult to control the weeds,
and the way we let the weeds grow, the way we seed some
forage, we might as well be using that moisture for a nurse
crop.