

# **Crop Residue Coverage of Soil Influenced by Crop Sequence in a No-Till System**

**Joseph M. Krupinsky, Steven D. Merrill, Donald L.  
Tanaka, Mark A. Liebig, Michael T. Lares,  
and Jonathan D. Hanson**



# Residue Quality Parameters for Ten Crops

## Crop Sequence Project, 2002 & 2003, Phase III

Dynamic Cropping Systems, Northern Great Plains Research Lab, Mandan, ND

Crop	Site one	Site two
Sunflower	1999	2000
Spring Wheat	2000	2001
Spring Wheat	2001	2002
<b>Crop strips</b>	<b>2002</b>	<b>2003</b>
Crop matrix	2003	2004
Spring wheat	2004	2005
Sunflower	2005	2006

# Residue Quality Parameters

Averaged Over Two Sites, 2002 & 2003, NGPRL, Mandan, ND

Crop	Acid detergent fiber (%)	Neutral detergent fiber (%)	Dry Matter (%)	In-vitro dry matter Digestibility (%)
Buckwheat	40.1	50.0	94.4	56.0
Canola	49.3	61.7	94.1	44.5
Chickpea	46.6	62.1	94.4	52.4
Corn	40.8	74.9	94.9	63.8
Dry Pea	50.5	63.8	95.0	51.7
Lentil	43.4	58.9	94.6	51.6
Proso Millet	38.9	67.5	93.8	54.8
Sorghum	41.0	71.2	94.6	63.2
Sunflower	45.0	54.0	93.2	55.9
Spring Wheat	47.5	74.8	95.7	47.0
LSD (0.05)	5.6	7.2	0.8	5.5
P-value	<0.0001	<0.0001	<0.0001	<0.0001

 = Highest value

 = Lowest value

# Crop Residue Coverage of Soil Influenced by Crop Sequence

Crop Sequence Project, 2004 & 2005, Phase III

Dynamic Cropping Systems, Northern Great Plains Research Lab, Mandan, ND

<b>Crop</b>	<b>Site one</b>	<b>Site two</b>
<b>Sunflower</b>	<b>1999</b>	<b>2000</b>
<b>Spring wheat</b>	<b>2000</b>	<b>2001</b>
<b>Spring wheat</b>	<b>2001</b>	<b>2002</b>
<b>Crop strips</b>	<b>2002</b>	<b>2003</b>
<b>Crop matrix</b>	<b>2003</b>	<b>2004</b>
<b>Spring wheat</b>	<b>2004</b>	<b>2005</b>
<b>Sunflower</b>	<b>2005</b>	<b>2006</b>

# Crop Residue Coverage of Soil Influenced by Crop Sequence Seeding wheat following ten crops, Crop Sequence Project, Phase III

*Dynamic Cropping Systems, Northern Great Plains Research Lab, Mandan, ND*



# Crop Residue Coverage of Soil Influenced by Crop Sequence

Seeding wheat following ten crops, Crop Sequence Project, Phase III

After seeding

Before seeding





**Crop Residue Coverage of Soil Influenced by Crop Sequence**

**Seeding wheat following ten crops, Crop Sequence Project, Phase III**

**Crop residue coverage of soil after seeding spring wheat**

**Chickpea  
residue**

042604  
Plot 480

**Proso  
Millet  
residue**

042604  
Plot 490



**Measuring  
crop  
residue  
coverage  
after  
seeding  
spring  
wheat**



Measuring  
crop  
residue  
coverage  
after  
seeding  
spring  
wheat

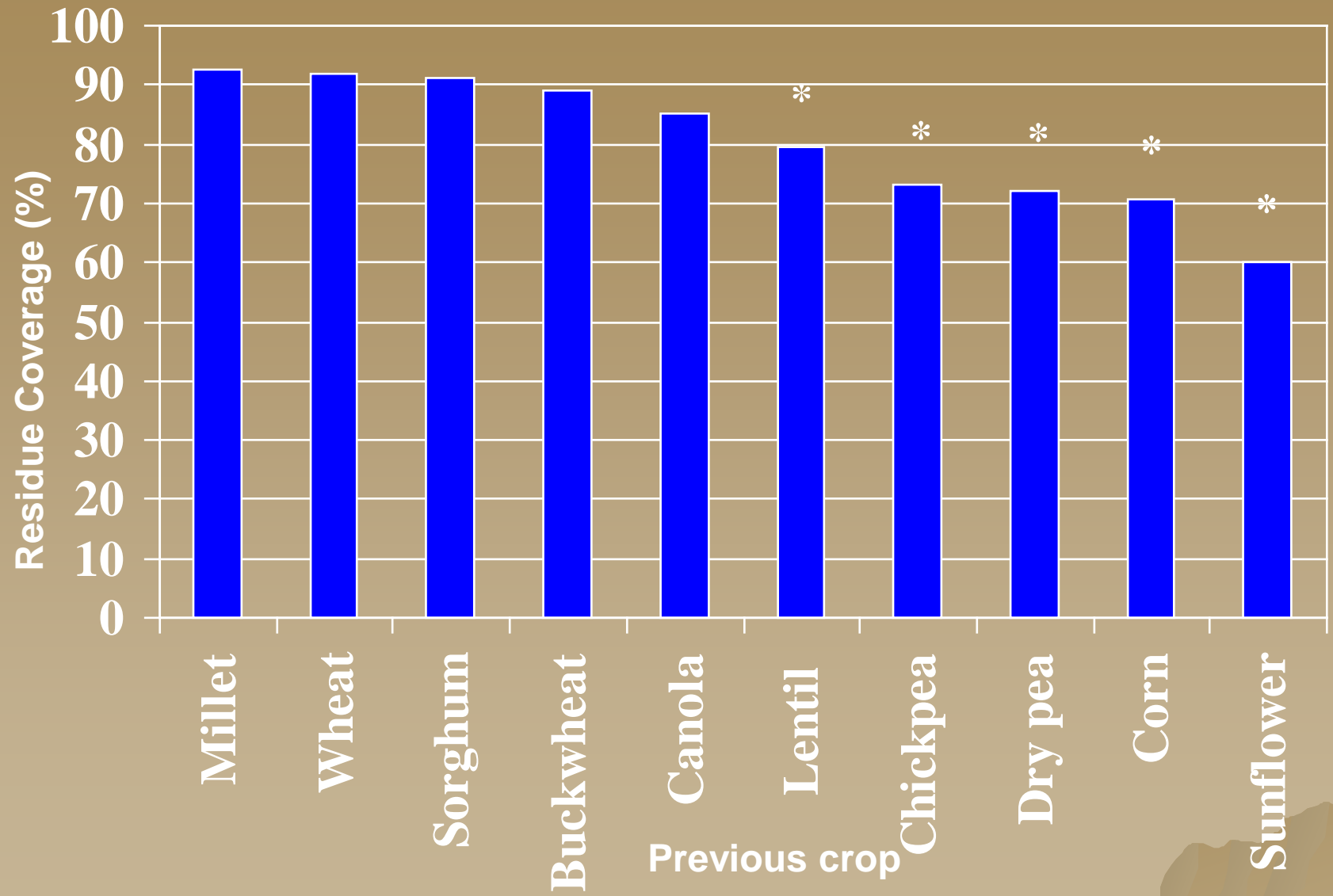


Measuring  
crop  
residue  
coverage  
after  
seeding  
spring  
wheat

(No residue)

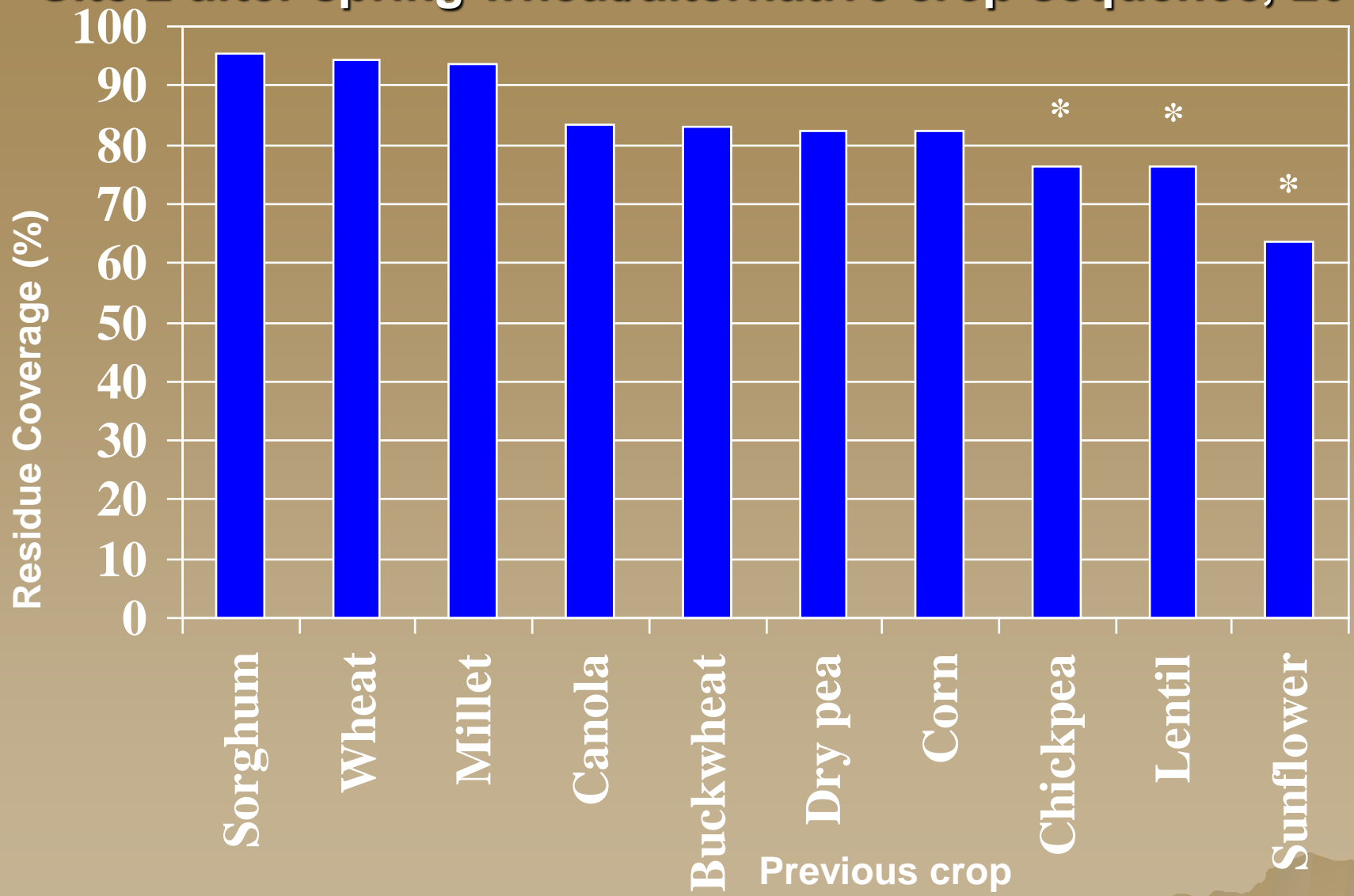


# A. Site 1 after spring wheat/alternative crop sequence, 2004



\* = crop sequence treatments with statistically less residue coverage than the continuous spring wheat treatment ( $P < 0.05$ )

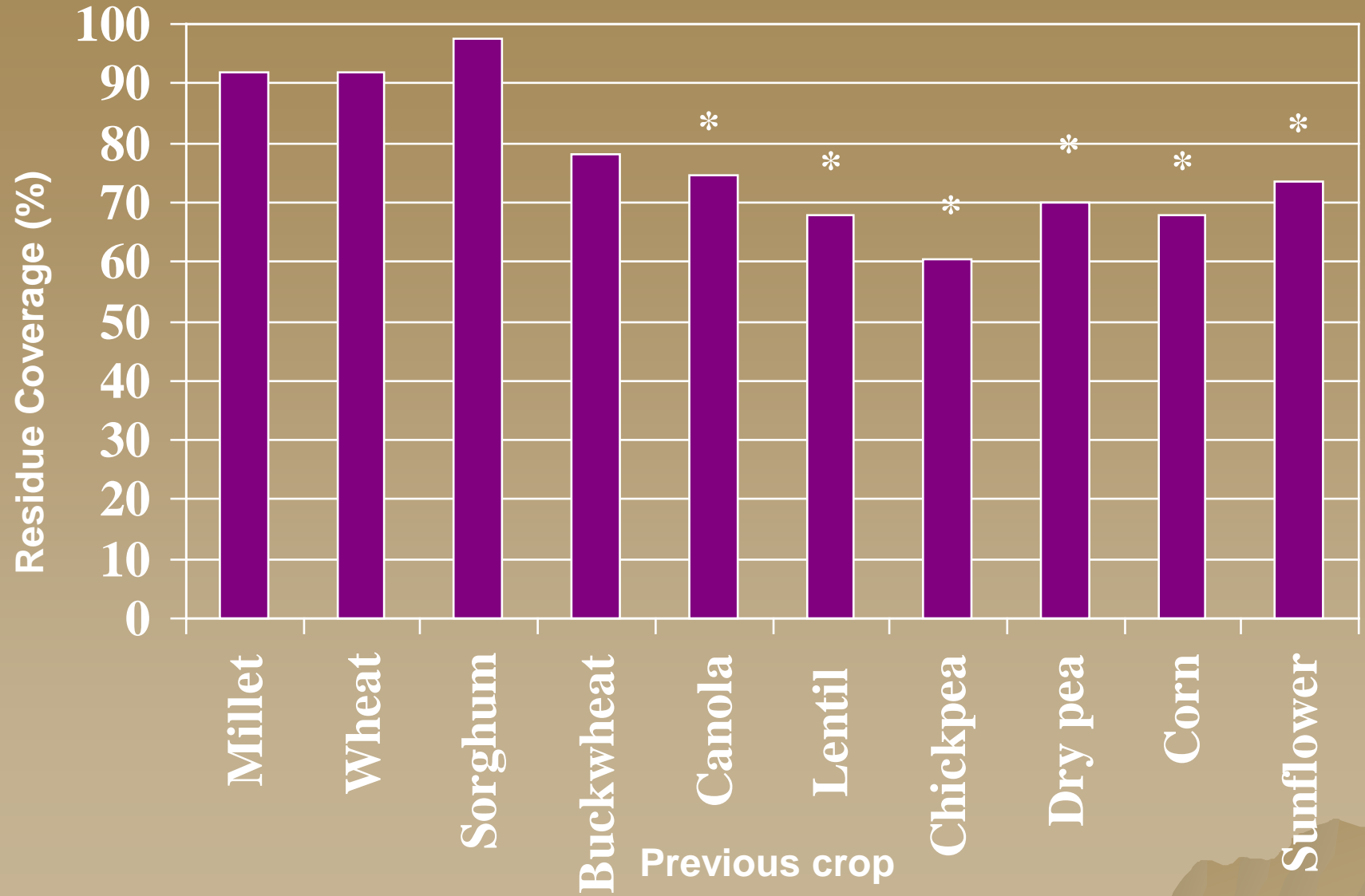
# B. Site 2 after spring wheat/alternative crop sequence, 2005



\* = crop sequence treatments with statistically less residue coverage than the continuous spring wheat treatment ( $P < 0.05$ )

C.

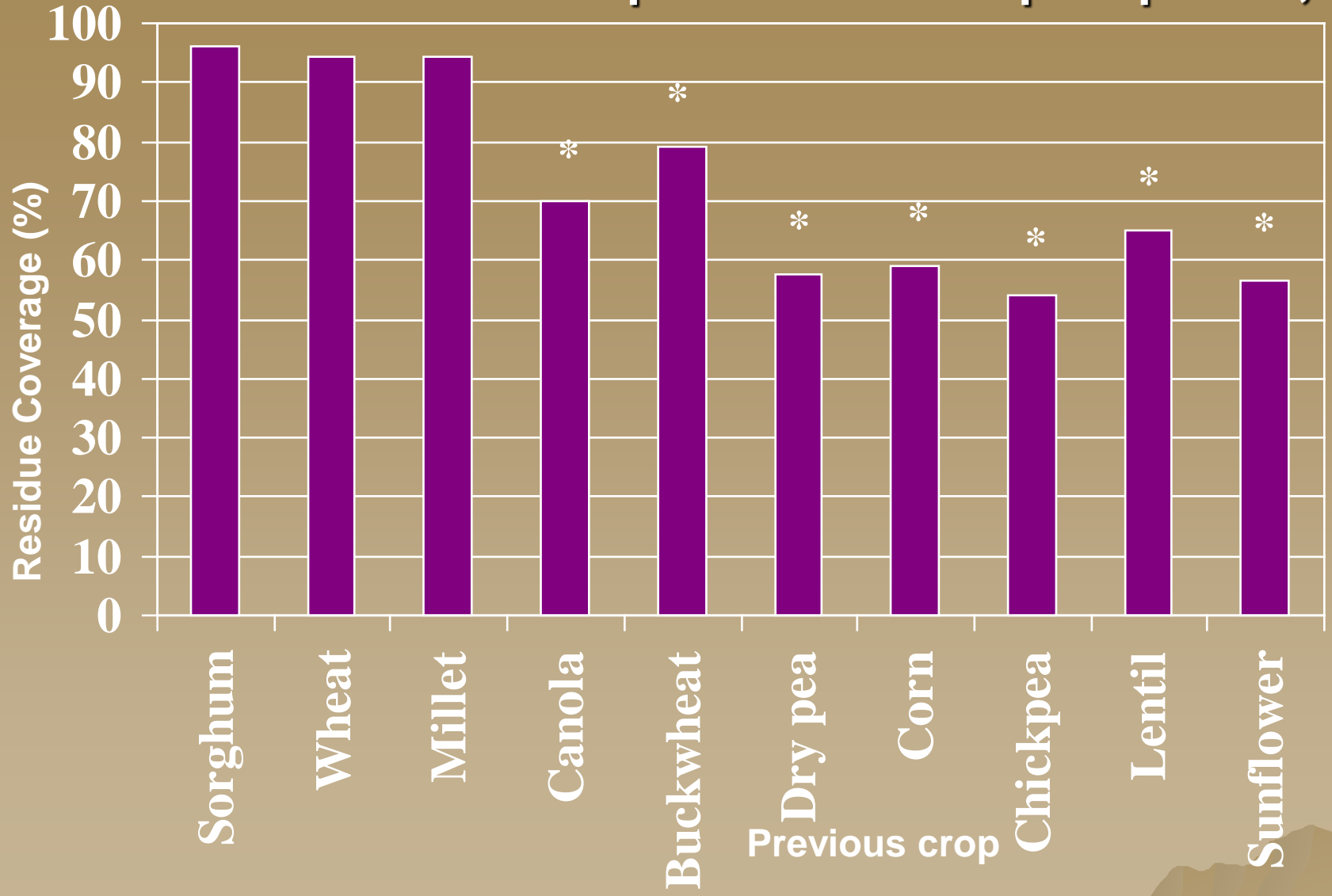
# Site 1 after alternative crop/alternative crop sequence, 2004



\* = crop sequence treatments with statistically less residue coverage than the continuous spring wheat treatment ( $P < 0.05$ )

**D.**

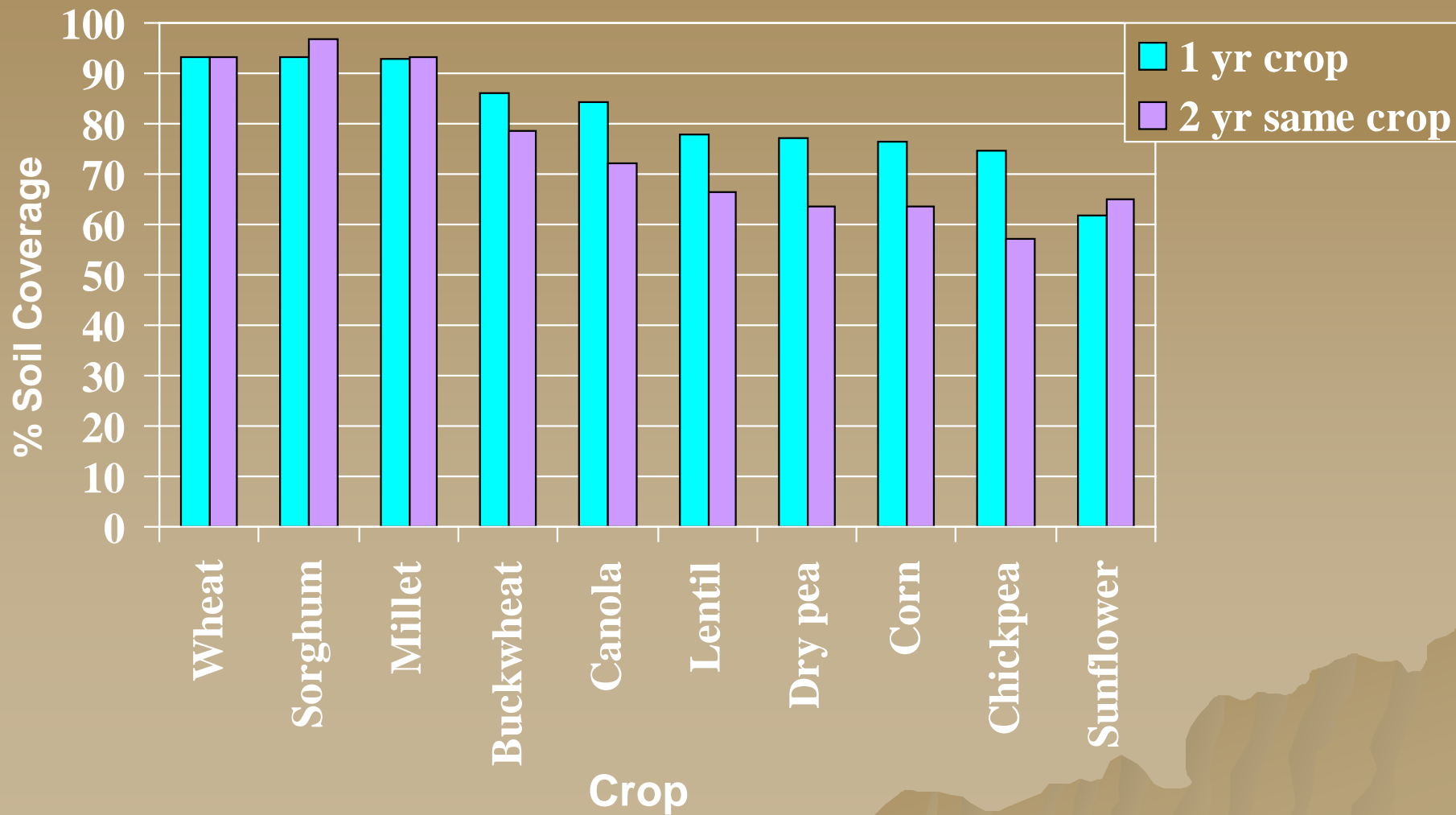
# Site 2 after alternative crop/alternative crop sequence, 2005



\* = crop sequence treatments with statistically less residue coverage than the continuous spring wheat treatment ( $P < 0.05$ )

# Soil Residue Coverage after Seeding Spring Wheat

Averaged over two sites, NGPRL, Mandan, ND



# Soil Residue Coverage Of Crop Sequences

Averaged Over Two Sites, NGPRL, Mandan, ND

\* = crop sequence treatments with statistically less residue coverage than the continuous spring wheat treatment ( $P < 0.05$ )

	2 <sup>nd</sup> yr crop									
1 <sup>st</sup> yr crop	Corn	Chickpea	Sunflower	Dry Pea	Lentil	Canola	Buckwheat	Millet	Sorghum	Wheat
Corn	64*§	68*	55*	73*	70*	77*	79*	92	92	90
Chickpea	64*	57*	55*	65*	64*	77*	77*	95	93	84
Sunflower	62*	58*	65*	66*	65*	72*	75*	91	91	87
Dry Pea	65*	63*	54*	64*	61*	74*	76*	93	93	89
Lentil	60*	63*	52*	66*	67*	72*	70*	90	92	86
Canola	58*	69*	52*	73*	66*	72*	77*	93	93	90
Buckwheat	67*	71*	60*	75*	70*	79*	79*	92	91	89
Millet	81*	76*	61*	79*	78*	85	86	93	94	93
Sorghum	81*	79*	70*	80*	79*	82*	89	94	97	91
Wheat	77*	75*	62*	77*	78*	84	86	93	93	93



# Crop Residue Coverage of Soil

## ABSTRACT

Field research was conducted to determine the influence of crop and crop sequencing on crop residue coverage of soil with 10 crops [buckwheat (*Fagopyrum esculentum* Moench), canola (*Brassica napus* L.), chickpea (*Cicer arietinum* L.), corn (*Zea mays* L.), dry pea (*Pisum sativum* L.), grain sorghum [*Sorghum bicolor* (L.) Moench], lentil (*Lens culinaris* Medik.), oil seed sunflower (*Helianthus annuus* L.), proso millet (*Panicum miliaceum* L.), and hard red spring wheat (*Triticum aestivum* L.)]. Crop residue production was obtained. Crop residue coverage of the soil surface was measured with a transect technique at the time of seeding spring wheat.

Crop residue coverage varied and was more clearly associated with the second-year crop than with the first-year crop of a 2-yr crop sequence. (Cont.)

# Crop Residue Coverage of Soil

## ABSTRACT, Cont.

Crop sequences composed of spring wheat, proso millet, and grain sorghum had higher crop residue coverage compared with sequences composed of the other crops. When these three crops and three crops that provide lower crop residue coverage of soil the subsequent year (lentil, chickpea, and sunflower) were analyzed as a subset to compare various sequences of crops providing a range of residue coverage, for example, lower (first yr)/lower (second yr), the surface residue coverage ranged from 65% for the lower/lower combination to 93% for the higher/higher combination in 2004 and from 56 to 94% in 2005, respectively.

A producer operating on more fragile soil and concerned about reducing soil erosion hazards would be advised to grow crops that provide higher residue coverage in the year before crops that provide lower residue coverage.

# Crop Residue Coverage of Soil

For additional information check:

**Krupinsky, J.M., S.M. Merrill, D.L. Tanaka, M.A. Liebig,  
M.T. Lares, and J. D. Hanson, 2007.**

**Crop Residue Coverage of Soil Influenced by Crop  
Sequence in a No-Till System. *Agronomy J.* 99:921-930.**

