

INTEGRATED MANAGEMENT OF JOINTED GOATGRASS IN THE PACIFIC NORTHWEST



Frank Young

USDA-ARS

Pullman, WA

*Jointed Goatgrass: A Grower's Nightmare &
A Researcher's Dream*

Cooperating Scientists

USDA-ARS

Alex Ogg Jr.

Steve Seefeldt

UI

Donn Thill

Bob Zemetra

WSU

Joseph Yenish

Laylah Sullivan

OSU

Dan Ball

Carol Mallory-Smith

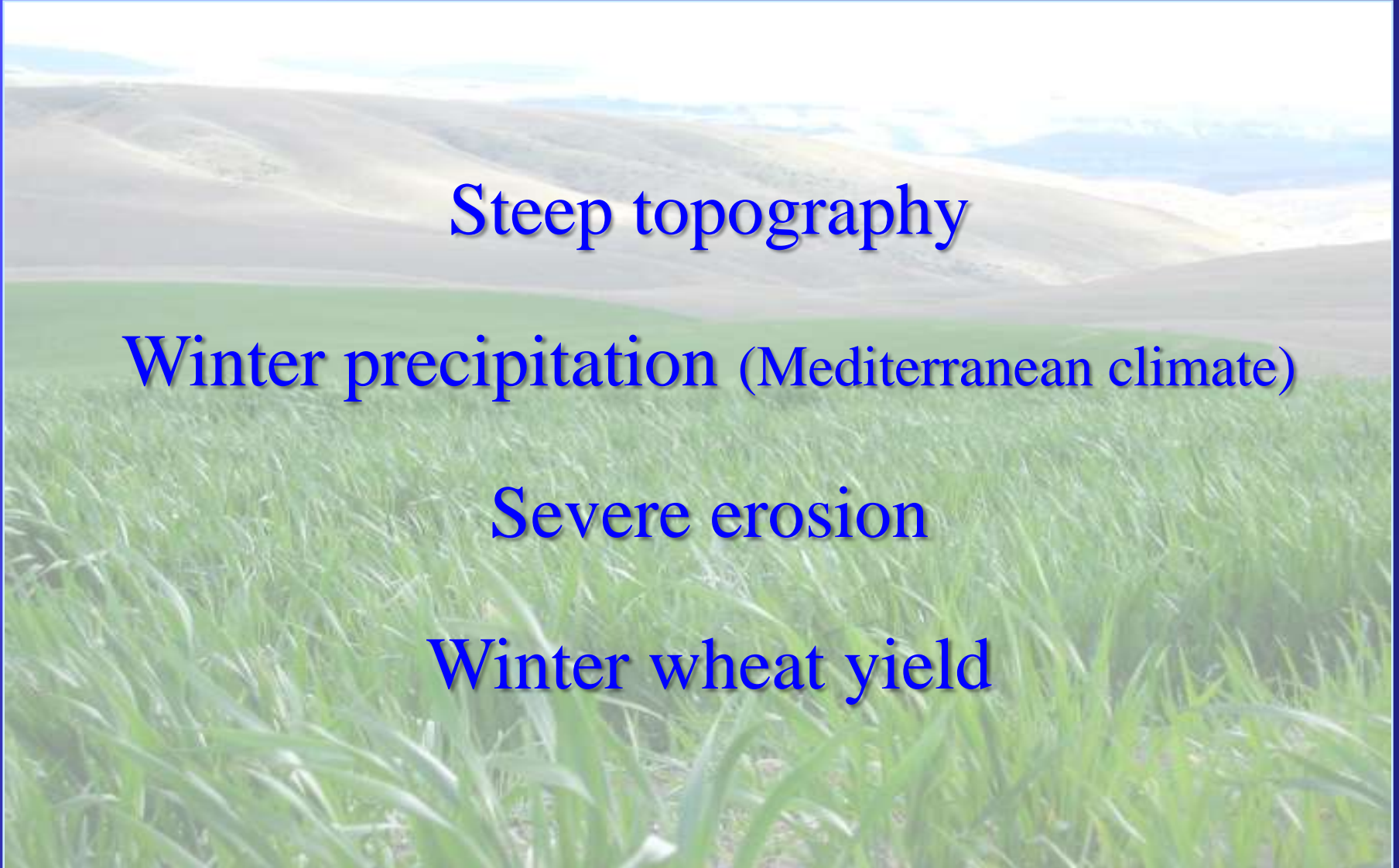
Palouse Region

Steep topography

Winter precipitation (Mediterranean climate)

Severe erosion

Winter wheat yield



Information to Share

- 1. Spring-germinating JGG study**
- 2. Imi-wheat study**
- 3. Plow study**
- 4. Integrated weed management study**
- 5. JGG resistance study**

Spring-Germinating JGG Study

The primary purpose of spring crops in JGG management systems is to prevent viable weed seed production and to facilitate the depletion of the soil weed seedbank.

Spring-germinating JGG can produce viable seed.....*need to delay planting 2 wks past optimum*

Plow Study

Based on question: “What can I do, when I am not growing winter wheat, to expedite my return to winter wheat production?”

Treatment 1



Treatment 2



Treatment 3



Treatment 4



Plow Study, Cntd.

- No-till SW ↓ JGG populations and spikelets more rapidly than ChF/C[®]WW.
- One-time spring deep plowing followed by no-till SW ↓ JGG populations more rapidly than continuous no-till SW.
- In identical crop sequences, shallow pre-plant tillage annually after one-time spring deep plowing ↓ JGG populations and spikelets compared to no-till crops after one-time plowing.

IMI-Wheat Study

Objective: Identify a stable crop production system that reduces JGG infestations based on time and frequency of the introduction of C[®]WW.

Location:

High rainfall zone –

WW-SB-SL (3 cycles)

Low rainfall zone –

WW-Fallow (3 cycles, 2 locations)

Results Imi-Wheat

Based on crop yield, JGG populations and spikes produced:

Treatments

C[®]-C[®]-C[®]

C[®]-C[®]-N

C[®]-N-C[®]

N-C[®]-C[®]

N-C[®]-N

N-N-C[®]



IWMM Study

Goal: A project designed to utilize the information generated from the many single component jointed goatgrass research studies conducted in the PNW.



IWMM Study, Cntd.

1. Develop an IWMS for JGG in WW.
2. Stubble burning, length of rotation, and integrated WW planting practices.
3. Identify profitable and economically stable crop production systems.



IWM Locations

Idaho – light

Washington – light to moderate

Oregon – heavy

Treatments

- Stubble burning
- Length of crop rotation
- Integrated planting - WW

Stubble Burning

- > 90% Control
- Soil surface
- High population



Rotation

- WW-Fallow – 1 yr
- WW-SB-Fallow – 2 yr
- SW-Fallow-WW-Fallow – 3 yr

IWM For Winter Wheat

Standard

- ✓ Fertilizer
- ✓ Standard cultivar
- ✓ Normal seed lot
- ✓ Normal density
- ✓ Double disk/Deep furrow

Integrated

- ✓ Fertilizer
- ✓ Competitive cultivar
- ✓ Increased seed size
- ✓ Increased density
- ✓ Hoe - drill

Oregon Site

- Highest weed population
 - Same wheat variety
- F-WW-F-WW & F-SW-F-WW



Materials And Methods (Initial)

- Weed seed sampling (August 96')
- Stubble burn (August 96')
- Weed seed sampling (August 96')

Base line jointed goatgrass populations in ID, WA, and OR (#)

Depth	ID	WA	OR
Surface	4	51	245
0 to 10cm	6	4	34
10 to 20cm	3	<1	3

Stubble burning effect on jointed goatgrass (#)

Site	Burn	Spikelets	Seed	Viable
ID	Y	2	5	2
	N	6	9	8
WA	Y	20	20	2
	N	50	65	60
OR	Y	200	225	25
	N	275	375	360

Materials & Methods

(1st Crop)

Winter Wheat

- Primary tillage (F 96')
- Fertilized (S 97')
- Tilled as needed
- Planted WW (F 97')

Spring Wheat

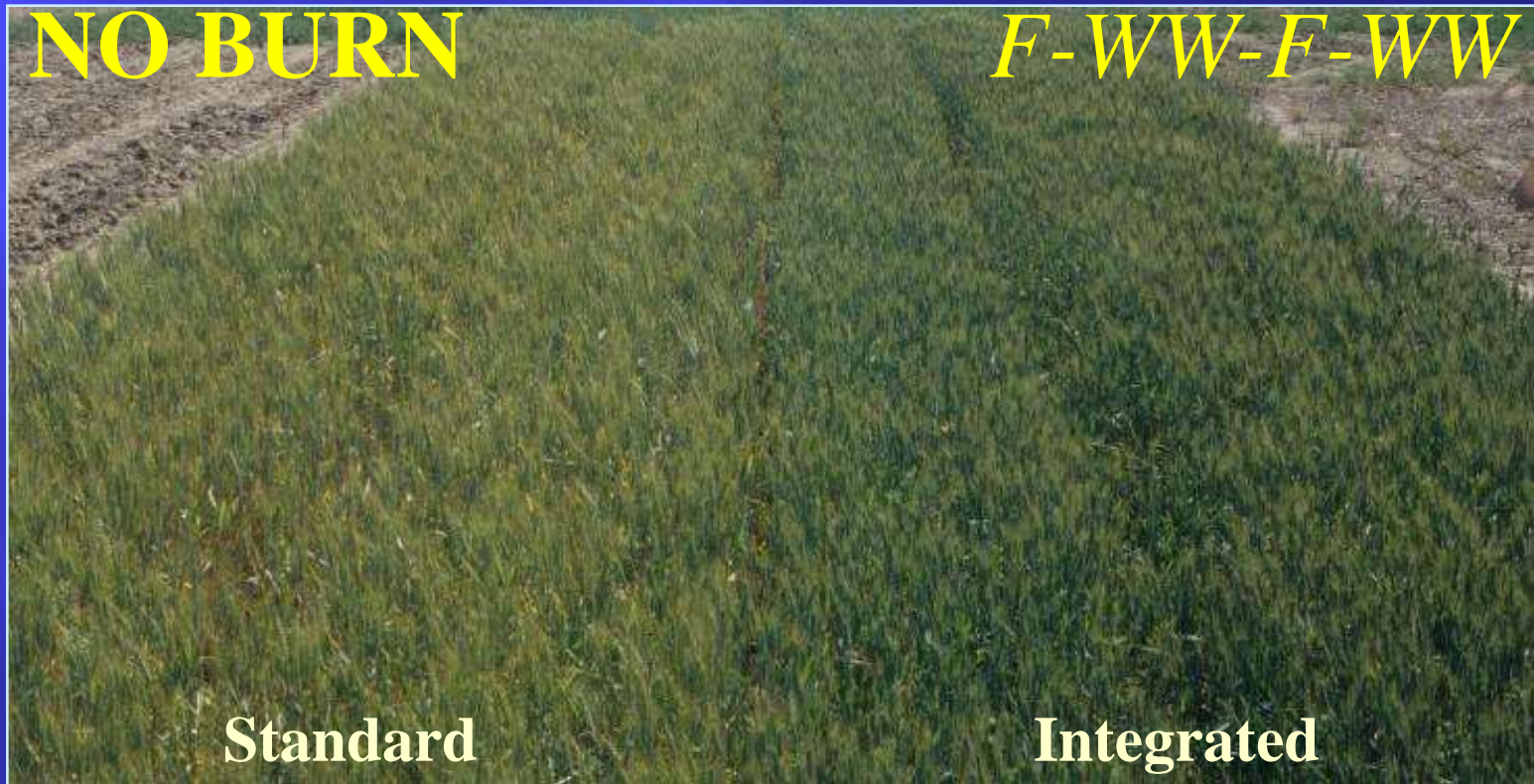
- Chem fallow
(F 96' - S 98')
- No-till SW (S 98')

Statistics

- HSU's multiple comparison used to select best treatment combinations with 95% confidence level
- Allows growers to identify the best combination of treatments for optimum production

Best combination of treatments for optimum yield and reduced dockage in 1998

Burn	Rotation	Practice	Yield (kg ha ⁻¹)	Dockage (%)
Y	WW	S	3495	1.69
Y	WW	I	4255**	0.36*
N	WW	S	3190	3.07
N	WW	I	4190*	0.48*
Y	SW-WW	S	3225	0.18*
Y	SW-WW	I	3135	0.04**
N	SW-WW	S	2655	0.32*
N	SW-WW	I	2905	0.67*



Materials And Methods

(2nd Crop)

Standard

- Summer fallow (F 98' - F 99')
- Fertilized (S 99')
- Planted - 76 kg ha⁻¹

Integrated

- Summer fallow (F 98' – F 99')
- Fertilized (F 99')
- Planted - 118 kg ha⁻¹

Best combination of treatments for optimum yield and reduced dockage in 2000

Burn	Rotation	Practice	Yield (kg ha ⁻¹)	Dockage (%)
Y	WW	S	2505	8.5
Y	WW	I	3005*	4.1*
N	WW	S	2250	19.5
N	WW	I	2905*	6.3
Y	SW-WW	S	2585	4.0*
Y	SW-WW	I	2840*	1.4**
N	SW-WW	S	2705	8.3
N	SW-WW	I	3110**	4.3

Best combination of treatments for optimum reduction of JGG density in 2001

Burn	Rotation	Practice	Plants (m⁻²)
Y	WW	S	103
Y	WW	I	75*
N	WW	S	173
N	WW	I	122
Y	SW-WW	S	38*
Y	SW-WW	I	24**
N	SW-WW	S	80*
N	SW-WW	I	60*

Overall Best Treatment Combination

One-time stubble burn, F-SW-F-WW rotation
using integrated WW management practices



JGG Resistance Study



Preliminary: Possible development of some resistant JGG biotypes although manifestation of resistance in these plants is not holding with the typical genetic ratios.

Remember

Keep in mind
why you are
doing what
you are doing.



QUESTIONS?



Integrate, Integrate, Integrate!

Statements by expert witnesses

Zemetra

“Not sure”

*Wheat and JGG Genetics

Mallory-Smith

“No idea”

*Herbicide Resistance

Shaner

“Beats me”

*Imidazolinones

