

2022 FFA Agronomy CDE Team Problem Scenario

The Palouse



Palouse wheat fields in the spring as seen looking south from Steptoe Butte

Location: Washington State Palouse region

Characterized by gentle rolling hills covered with wheat fields that look like giant sand dunes. The hills were formed over tens of thousands of years from wind blown dust and silt, called "loess". Originally, dryland farming required the land to be plowed along the contours of the hills, not straight up and down the slopes. No-till is more common and an accepted modern practice. Tillage practiced there is no-till or 2/3 pass systems, meaning you apply as many compatible inputs (fertilizer + herbicide/fungicide) as possible on each pass or you only make 2 or 3 passes during the entire growing season.

A practice of blending wheat seed varieties has been utilized as a method of reducing production risk including drought and high temperatures. Using a single variety has the potential for maximum production if weather and pest conditions are good but a risk of considerable yield loss if these conditions are unfavorable during the crop development season. Both single or blended seeded varieties might produce an 80-90% relative yield with normal weather and pests. In adverse weather and pest conditions a single variety might result in 60% relative yield where a blend may still yield 80% of relative yield.

Many producers still go by #'s of seed rather than seeds/acre. Pounds are from 30-60#/acre in low rainfall (6-12" precipitation) to 90-120#/acre on higher precipitation areas (14-25" precipitation). Normal seeds/pound are about 11,500 of soft white winter wheat in the Pacific Northwest.

Wheat variety blends based on rainfall

> 16 Inches of Rain Fall Blends

1. LCS ArtDeco/ LCS BlackJack
2. Sockeye CL+/Resilience CL + (Clearfield Blend)

Seeding rates 110-120 pounds per acre based on a 11,500 seed count

12- 16 Inches Rain Fall

3. Norwest Duet/Puma
4. UI Magic CL+/StingRay CL+ (Clearfield Blend)

Seeding rates 110-130 pounds per acre based on a 11,500 seed count

< 12 Inches Rain Fall

5. AP Illiad/LCS Shine
6. Curiosity CL + Mela CL+ (Clearfield Blend)

Seeding rates 70-90 pounds per acre based on a 11,500 seed count

Field size and soil test you are managing: 410 acres. Also see addendum Eastern Washington Nutrient Management Guide for fertilizer recommendations.

Assumed details:

You will plant 120# seed/acre, you will yield 105 bu/acre @ \$8.50/bu, and land rent is 50/50% share of income and input cost (fertilizer, seed and pesticides). – landowner pays half the inputs and gets half the total income, farmer pays for half the inputs and all machinery/hauling costs, while receiving the other half of total income.

Two separate passes of the fungicide “Tilt” must be made based on wheat stripe rust post green up and flagleaf. Herbicide and fungicide at green-up and fungicide only at flagleaf.

All fertilizer applied at planting, and the field will be planted without tillage. Soil pH in the region is too low and it is not always economically feasible to correct it in the short term. Fertilizer recommendations provided have been developed for a low soil pH environment.

An annual precipitation rate of 15” for 2022-2023.

Elevators in the area is located 15 miles (one way) from the farm and they always discount Goat grass seed if found in harvested sample at \$0.50/bu

Grower/farmer that you are consulting wants concerned about their profit per acre for this field. The farmer’s goal is \$250 profit per acre. Input prices are soaring, yet they want to maintain an agronomically sound cropping plan.

Sample Date : 09/10/22		Date Recv'd : 09/10/22							
Sampler(s) :		Date Reported : 09/11/22							
GROWER :		REPORT #							
FIELD ID :		Price :							
Comments:									
NUTRIENTS	Soil Bulk Density	NO ₃ N (1 N KCl))	NO ₃ N	NH ₄ N (1 N KCl)	NH ₄ N	SO ₄ S (DTPA-Sorb)	SO ₄ S	Avail. H ₂ O	
Depth (inches)	million lbs/acre-depth	ppm (mg/kg)	lbs/acre-depth	ppm (mg/kg)	lbs/acre-depth	ppm (mg/kg)	lbs/acre-depth	inches/depth	
0/6	1.37	11.5	15	16.2	22	4	5	1.33	
6/12	1.43	6	9	0.7	1	3	4	1.34	
12/24	2.72	11	30	0.3	1	4	11	2.52	
Total (sum of depths) lbs/acre			54		24		21		
Estimated N Release from Organic Matter (ENROM) lbs/acre			80	Total Available Moisture =					5.19
m of Available N (NO3N + NH4N + ENROM) lbs/acre			158						
Extraction Method		1st Depth	2nd Depth	3rd Depth	4th Depth	Interpretation (1st depth)			
Phosphorus, Olsen, ppm (0.5N NaHCO ₃)		26	19	12		Medium High			
Phosphorus, Bray P1, ppm (NH ₄ F, HCl)		38	29	19		High			
Phosphorus, Bray P2, ppm (NH ₄ F, HCl x 4)									
Potassium, Olsen, ppm (0.5N NaHCO ₃)		720	553	466		Very High			
Boron (B), ppm (DTPA-Sorb)		0.11	0.11	0.21		Very Low			
Zinc (Zn), ppm (DTPA-Sorb)		0.57	0.31	0.26		Low			
Manganese (Mn), ppm (DTPA-Sorb)		23.1	8.9	1.3		Very High			
Copper (Cu), ppm (DTPA-Sorb)		0.8	1.0	0.8		Medium			
Iron (Fe), ppm (DTPA-Sorb)		68	53	19		Very High			
Molybdenum (Mo), ppm (DTPA-Sorb)									
Aluminum (Al), ppm (DTPA-Sorb)		19	11	1		Very High			
Aluminum (Al), ppm (1N KCl)		13.0	3.0	1.0		High			
Chloride (Cl), ppm (ISE Buffer)		5.3	5.1	8.7		Medium			
SOIL CHARACTERISTICS		1st Depth	2nd Depth	3rd Depth	4th Depth	Interpretation (1st depth)			
pH (1 H ₂ O:1 Soil)		4.95	5.2	6.84		Strongly Acidic			
Electrical Cond. (EC 1:1) (dS/m)		0.27	0.17	0.3					
~ Soluble Salts (Sat. Paste) (dS/m)		0.70	0.44	0.78		Negligible salt effects			
Organic Matter % (Walkley-Black)		4.14	2.68	1.82		High			
Effervescence (Scale = 0 to 7)		0	0	0		Very Low			
%Lime (Calcium Carbonate (CaCO ₃))									
EXCHANGEABLE BASES		% of CEC	Quantities of Exchangeable Bases (meq/100g)				Buffer pH for lime req.		
Typical ranges in %		1st Depth	1st Depth	2nd Depth	3rd Depth	4th Depth	pH _{Ca}		
Calcium (Ca) (1N KCl) (55 - 75)		45.5%	7.0	8.8	10.6		pH _{SMP}		
Magnesium (Mg) (1N KCl) (15 - 30)		11.0%	1.7	2.2	3.4		pH _{A-E}	7.09	
Sodium (Na) (1N KCl) (0.1 - 5)		0.2%	0.03	0.03	0.07		pH _{A-E2}	7.21	
Potassium (K) (NaHCO ₃) (2 - 8)		11.9%	1.84	1.41	1.19		Sand%		
Total Bases (Ca + Mg + Na + K)			10.6	12.4	15.3		Silt%		
~ Cation Exchange Capacity (CEC)			15.4	17.3	17.9		Clay%		
~ Percent Base Saturation (TB/CEC)			69%	72%	85%				

Best-test Analytical Services will make every effort to provide an accurate analysis of the sample as received, with liability limited to the cost of the analysis. For reasonable cause tests will be repeated. No other warranties, expressed or implied are given. Recommendations serve only as a general guide and should be adjusted to specific situations and conditions.

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See Eastern Washington Nutrient Management Guide to help determine soil test results/recommendations.

Rotation you are managing:

2020 soft white winter wheat – 2020 seeded at 1,500,000 seeds/acre. Variety was a Clearfield (CL+), two-gene variety that was Imidazolinone (IMI) tolerant. This variety was used due to applying Beyond herbicide to help control Jointed Goatgrass. Fertilized for a 100 bu/acre expected yield, 250# total Nitrogen, 15# Phosphorus, 15# Sulfur, and 15# Chlorine per acre.

2021 Soft white spring wheat seeded at a rate of 1,260,000 seeds/acre. An Imidazolinone tolerant Clearfield (CL+) wheat variety was used due to chemical carryover. Fertilized for a 70 bu/acre expected yield, total 175# Nitrogen, 15# Phosphorus, 10# Sulfur, and 10# Chlorine per acre.

2022 spring – peas – spring planted 2022 with summer harvest – seeded at 8 seeds/ft², no added fertilizer

2023 soft white winter wheat – fall 2022 planting with harvest in summer 2023 - **you are planning for this crop/year**

Major Crop Pests

*Weeds

Annual Sowthistle
Jointed Goatgrass
Downy Brome
Rattail Fescue

*Insects

Wireworm
Hessian Fly
Army Cutworm
Bird-cherry Oat Aphid

*Diseases

Stripe Rust
Cephalosporium Stripe
Stem Rust
Strawbreaker Foot Rot

Fungicides are in season applications during crop development for stripe rust, powdery mildew. Insecticides are used as seed treatments for aphids, wireworms, and other pests.

Wheat stripe rust (a foliar fungal disease) has become an annual problem for much of the area. Rust spores infect young wheat plants often in the winter or early spring when weather conditions are ideal (relatively cool conditions during much of the growing season) for infection and development. A heavy infection can decimate crop yield (up to 90% loss) if not treated and managed with fungicide applications in the spring and early summer up to wheat anthesis.



Cephalosporium stripe (leaf stripe) is caused by a soilborne pathogen, a fungus, and is more severe in wheat fields that follow wheat or other susceptible cereal or grasses and is more severe in fields seeded early relative to the production area. Yield loss can be 100% when disease is severe and a highly susceptible variety is grown. Soils having a pH of less than 5.5 favor disease development, fungus survival, and spore production. Seed treatments and foliar fungicides are not effective in controlling Cephalosporium stripe; therefore, disease control relies on cultural practices and variety selection.



Costs

Seed –

IMI blend (Clearfield blend) - \$21/bushel = 60 pounds = 11,500 seeds per pound
Sockeye CL+/Resilience CL + (Clearfield Blend)
UI Magic CL+/StingRay CL+ (Clearfield Blend)
Curiosity CL + Mela CL+ (Clearfield Blend)

Non-IMI blend - \$18/bushel = 60 pounds = 11,500 seeds per pound
LCS ArtDeco/ LCS BlackJack
Norwest Duet/Puma
AP Illiad/LCS Shine

Fertilizer – priced by the ton, do not blend dry with liquid fertilizers

21-0-0-24S Amm. Sulf. (dry)	\$842.00
0-0-25-17S Potassium Thiosulfate (liquid)	\$927.00
0-0-0-90S Tiger Sul (dry)	\$1,300.00
45-0-0 Urea (dry)	\$1,100.00
11-52-0 Map (dry)	\$1,060.00
0-0-60 Potash (dry)	\$895.00
32-0-0 UAN (liquid)	\$695.00

Herbicides

Anthem Flex \$530/GAL
Beyond \$450/Galf

Fungicide –

Tilt \$140/gal

Insecticides – seed treatment included in cost

Planting - air seeding no-till with fertilizer application \$18.25/acre

Harvest - \$25/acre

Spraying - application with self-propelled sprayer \$7.50/acre

Transportation - \$0.20/bu up to 20 loaded miles. Additional \$0.08/bu/mile over 20 loaded miles.

Management plan to include: IPM, fertility, and seeding management strategies for 2023 soft white winter wheat crop year.

Calculations to include: costs, income, breakeven, and profit/loss for that field based on the planting year (Fall 2022) and harvest year (2023).