

Forage Wheat Trial Results

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The 2022-2023 growing season was the second season we tested winter annual forages for a potential dual-purpose crop. There is little information available on the quality and yield of forage for dual-purpose wheats as they have not been widely grown in our region. It is critical to possess local information about wheat varieties that have favorable forage characteristics with a potential for grain production and vice versa. This season we included two traditional grain wheat varieties to determine their suitability for potential forage production.

Testing Methods:

We planted eight varieties in small plots (6' by 30') next to the regular wheat variety trials at three dryland locations: Akron, Burlington, and Yuma. The eight varieties were Ray, Willow Creek, MTF1435, TAM 204, OK Corral, AP Baldy, Fortify SF, and Whistler. Forage sub-samples were cut from the center of the plots in May or June as each variety reached the early heading stage. We obtained forage wet and dry weights (used to calculate dry matter yield), along with hay quality information based on NIR analyses done at CSU. The remainder of the plots were harvested for grain (yield area adjusted to account for forage sampling), and grain test weight and protein analyses were performed.

Yield, test weight, and dry matter yield values were statistically analyzed, and least significant differences are provided under each location table to compare varieties within a location.

Results:

We harvested forage and grain from all three sites. Forage dry matter yield, harvest moisture, and quality, along with grain yield and quality from the three locations are shown on the next page.

Wheat varieties developed for forage often produce low grain yields, as shown by Willow Creek, which produces a lot of dry matter but very low grain yield. Grain yield has been improved in the two newer varieties out of Montana, Ray and MTF-1435, to the point they would be acceptable dual-purpose wheats. OK Corral out of the Oklahoma breeding program produced acceptable forage yields and had the highest grain yield at two of the sites. At the Yuma site, the traditional wheat varieties, Whistler and Fortify SF, produced the highest grain yields.

When comparing forage quality among varieties, you want to see higher crude protein (CP), in vitro true dry matter digestibility (IVTDMD48), digestible neutral detergent fiber (dNDF48), and relative feed value (RFV) and lower acid detergent fiber (ADF), neutral detergent fiber (aNDF), and lignin. As with many forages, as dry matter yield increases, forage quality decreases which was evident with some of the varieties evaluated in this trial. The varieties developed in Montana (Willow Creek, Ray, and MTF-1435) tended to have higher forage yields but were lower in CP and higher in fiber (ADF and NDF), especially at the Yuma site. The higher yield was related to more stem production which tends to be lower in quality. One variety that surprised us was Fortify SF which is wheat stem fly tolerant. It did not have the forage yield like some of the other varieties but was leafy, had a soft texture, and overall higher forage quality. If you had to pick one variety out of the ones evaluated for dual-purpose use, it would be OK Corral for its potential grain yield, intermediate forage yield, and higher forage quality.

2023 Dryland Winter Forage Variety Performance Trials at Akron, Burlington, and Yuma

Brand/Source	Variety	Grain Harvest			Forage Harvest		Forage Quality ^a							
		Yield bu/ac	Test		Dry Matter Yield ton/ac	Moisture % at harvest	Harvest Date	CP	ADF	aNDF	dNDF48	LIGNIN	IVTDMD48	RFV
			Weight lb/bu	Protein percent										
Akron														
Montana State Univ.	MTF1435	56.0	47	12.7	4.4	79	7-Jun	7.0	37.8	66.4	36.4	5.4	73.9	83
PlainsGold	Ray	57.5	42	12.9	4.2	78	8-Jun	6.3	37.2	65.7	37.9	4.6	75.4	85
Watley Seed	TAM 204	77.0	49	12.9	4.2	78	28-May	9.3	31.4	59.8	37.3	4.1	80.6	101
Montana State Univ.	Willow Creek	31.5	48	13.8	3.8	80	13-Jun	6.3	40.4	67.1	36.2	5.9	71.9	80
Oklahoma Genetics, Inc	OK Corral	94.0	52	12.0	3.6	79	31-May	11.1	31.8	60.4	38.7	3.8	82.2	99
PlainsGold	Whistler	77.5	50	11.9	3.3	80	31-May	9.3	32.2	61.5	37.2	4.0	79.8	97
AgriPro	AP Baldy	71.0	52	12.3	3.2	80	31-May	10.7	33.1	60.2	35.6	4.0	79.6	98
PlainsGold	Fortify SF	76.5	52	11.1	3.1	75	28-May	9.9	31.8	59.4	36.5	3.9	81.2	101
	Average	67.5	49	12.5	3.7	79	2-Jun	8.7	34.4	62.6	37.0	4.5	78.1	93
	LSD (0.30) ^b	6.0	1		0.5									
	LSD (0.05) ^b	12.0	3		NS									
	Coefficient of Variation (CV)	10.1	3.1		13.7									

Brand/Source	Variety	Grain Harvest			Forage Harvest		Forage Quality ^a							
		Yield bu/ac	Test		Dry Matter Yield ton/ac	Moisture % at harvest	Harvest Date	CP	ADF	aNDF	dNDF48	LIGNIN	IVTDMD48	RFV
			Weight lb/bu	Protein percent										
Burlington														
Montana State Univ.	Willow Creek	42.5	54	13.5	4.4	77	7-Jun	5.1	41.4	69.4	34.2	6.7	66.8	76
PlainsGold	Whistler	84.5	54	11.4	4.2	86	22-May	10.7	31.3	61.6	37.2	3.8	79.6	97
Montana State Univ.	MTF1435	77.0	53	11.4	4.2	78	26-May	7.2	35.7	65.3	34.5	4.6	72.7	87
PlainsGold	Ray	73.5	44	11.7	4.1	78	26-May	10.6	31.3	59.4	36.2	3.0	81.0	101
Oklahoma Genetics, Inc	OK Corral	92.0	55	11.7	3.3	85	22-May	10.5	29.2	58.2	37.2	3.3	82.4	106
AgriPro	AP Baldy	83.0	58	11.8	3.3	77	22-May	10.9	29.5	59.0	35.8	4.1	79.8	104
PlainsGold	Fortify SF	79.0	56	10.7	2.9	78	19-May	12.3	29.3	58.8	35.8	3.3	81.4	104
Watley Seed	TAM 204	91.5	55	11.9	2.8	78	19-May	11.0	30.2	59.8	35.0	3.6	79.3	102
	Average	78.0	54	11.8	3.6	80	24-May	9.8	32.2	61.4	35.7	4.0	77.9	97
	LSD (0.30) ^b	4.0	1		0.3									
	LSD (0.05) ^b	8.0	1		0.7									
	Coefficient of Variation (CV)	5.7	1.4		10.0									

Brand/Source	Variety	Grain Harvest			Forage Harvest		Forage Quality ^a							
		Yield bu/ac	Test		Dry Matter Yield ton/ac	Moisture % at harvest	Harvest Date	CP	ADF	aNDF	dNDF48	LIGNIN	IVTDMD48	RFV
			Weight lb/bu	Protein percent										
Yuma														
Montana State Univ.	MTF1435	45.5	49	11.6	4.2	78	7-Jun	2.2	41.1	72.1	35.8	5.8	66.1	73
Montana State Univ.	Willow Creek	26.0	50	12.8	4.1	75	13-Jun	4.9	38.2	67.6	36.3	5.1	71.2	82
PlainsGold	Ray	49.5	48	11.0	3.4	78	7-Jun	3.5	38.2	66.8	37.0	4.5	73.0	83
Oklahoma Genetics, Inc	OK Corral	55.5	55	12.5	3.2	76	28-May	7.2	31.2	60.0	36.7	3.1	79.6	100
PlainsGold	Whistler	62.0	55	14.5	3.2	78	31-May	4.4	35.0	66.5	36.5	4.3	73.1	86
PlainsGold	Fortify SF	66.5	58	12.8	3.0	79	28-May	7.5	33.8	64.4	37.4	3.7	76.9	91
Watley Seed	TAM 204	54.0	52	10.9	2.8	77	28-May	7.7	31.5	61.6	36.7	3.6	77.9	98
AgriPro	AP Baldy	53.5	55	11.4	2.3	81	31-May	7.5	32.0	61.3	35.6	4.2	76.9	97
	Average	51.5	53	12.2	3.3	78	2-Jun	5.6	35.1	65.1	36.5	4.3	74.3	89
	LSD (0.30) ^b	4.5	1		0.4									
	LSD (0.05) ^b	9.0	1		0.8									
	Coefficient of Variation (CV)	9.6	1.5		12.9									

^aAll forage quality analyses results are dry basis values. CP=crude protein; ADF=acid detergent fiber; aNDF=neutral detergent fiber; dNDF48= digestible neutral detergent fiber at 48 hours; IVTDMD48=in vitro true dry matter digestibility at 48 hours; and RFV=relative feed value.

^bIf the difference between two variety yields equals or exceeds the LSD value, the difference is significant. Farmers selecting a variety based on yield should use the LSD (0.30) to protect from false negative decisions. Companies or researchers may be interested in the LSD (0.05) to avoid false positive conclusions.

Trials were harvested for grain on July 13 (Burlington), July 19 (Yuma), and August 5 (Akron).