VARIETIAL DIFFERENCES IN WHEAT GRAIN STARCH, PROTEIN AND FIBER CONTENT

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INTRODUCTION

Wheat grain is primarily composed of starch, protein, and fiber. In addition to food uses, wheat grain can have many diverse end uses based on grain composition. The object of this study is to look at differences in grain starch, protein, and crude fiber content among modern soft red winter wheat varieties.

The soft red winter wheat grown in Kentucky typically has higher starch and lower protein than hard wheats. This makes soft wheat well suited for baked goods such as, biscuits, crackers, cakes, etc., which tend to crumble. The higher protein content of hard wheat grain is essential for bread making, with the protein providing dough elasticity. It should be noted however, that grain protein and starch content can vary within a grain type, i.e. differences among soft red winter wheat varieties.

Wheat proteins have many diverse applications for food uses and to a lesser extent industrial uses such as, in some building materials, plastics and pharmaceuticals. Wheat starch is a primary source of food energy for humans/animals and its unique thickening qualities make it an important food additive. Starch has many other industrial uses, such as ethanol production, biodegradable plastics and other materials.

Wheat is a good source of crude fiber which has been shown to reduce the risk of colon cancer and diverticular disease. Fiber has also been shown to reduce blood cholesterol and lower diabetes risk. These potential health benefits of increasing dietary fiber have led to greater demand for wheat fiber as an additive in processed foods.

METHODS

Eighty eight soft red winter wheat varieties/lines were evaluated for differences in starch, protein and crude fiber content. At maturity, grain samples were collected from 2 reps of a 2009 University of KY wheat variety test in Lexington, KY. The cleaned samples were air dried for 1 week and then analyzed for starch, protein, and crude fiber content using a Perten DA7200 NIR spectrometer.

RESULTS AND DISCUSSION

Grain starch content ranged from 66.5 to 69.7%, with an average of 68.2%. Protein content ranged from 11.7 to 14.8%, with an average of 13.0%. Crude fiber content ranged from 2.7 to 3.2%, with an average of 3.0%. The results show that grain starch, protein and crude fiber can vary 4.6, 20.9, and 15.6%, respectively among modern soft red winter wheat varieties/lines. It is important to note this general difference among varieties as a whole rather than focusing on individual varietal results. Due to the limited sample size for this study, it should not be assumed that for example AgriPro COKER 9511, Dyna-Gro V9710 and Pioneer 25R15 are high protein/ low starch varieties – though the results of this study indicate as such. A larger study with more reps and test locations would be required before rating particular varieties as being high or low protein/starch varieties.

Table 1. Wheat varietal differences in grain protein, starch, and crude fiber content.

	Protein (%)	Starch (%)	Crude Fiber (%)
AgriPro Branson	12.6	68.4	3.0
AgriPro COKER 9511	14.5	67.5	3.0
AgriPro COKER Oakes	12.3	68.3	3.2
AgriPro W1104	12.8	67.9	3.0
AgriPro W1377	12.6	68.7	2.9
AgriPro W1566	12.1	68.8	2.9
ARMOR 360Z	12.6	68.9	3.0
ARMOR ARX 6202	13.4	67.9	3.0
ARMOR ARX 840	12.2	68.2	3.0
ARMOR GOLD	13.7	67.2	3.0
ARMOR RENEGADE	12.2	68.4	3.1
Beck 113	12.4	67.9	3.0
Beck 122	12.2	69.1	3.1
Bess	12.4	68.9	3.1
Clark	13.4	68.1	3.0
Cumberland	13.0	67.8	2.9
Delta Grow 1600	12.3	68.6	3.1
Delta Grow 4500	13.1	67.9	3.0
Delta Grow 5200	12.0	69.3	3.0
Delta King 9108	13.1	68.7	2.9
Delta King 9577	13.0	68.6	3.0
Dixie 907	12.7	68.4	3.1
Dixie 940	12.9	69.4	3.1
Dixie 989	13.3	67.7	3.1
Dyna-Gro 9911	13.6	68.3	3.0
Dyna-Gro 9922	13.1	67.5	3.0
Dyna-Gro Shirley	13.6	68.6	2.9
Dyna-Gro V9710	14.8	66.5	3.2
Dyna-Gro V9723	12.8	69.4	3.1
Dyna-Gro V9812	13.4	67.5	3.0
EXCEL 163	14.1	67.2	3.1
EXCEL 234	12.5	69.0	3.1
EXCEL 341	12.7	68.3	3.0
Exsegen Anna	13.7	67.5	3.0
Exsegen Candace	12.4	69.1	3.0
Exsegen Dinah	13.5	68.9	2.9
Exsegen Lois	13.0	67.6	3.1
Exsegen Lydia	13.1	66.9	3.0
Jamestown	13.8	67.2	3.1
KAS 5003	13.5	68.3	2.9
KAS 5058	13.6	68.7	2.9
KAS 7700	12.8	67.3	3.0
KY 00C-2059-24	13.1	69.1	2.8
KY 00C-2109-01	13.6	67.7	3.0

KY 00C-2175-10	13.6	68.3	2.9
KY 00C-2567-01	12.6	68.2	3.1
KY 00C-2697-04	13.4	68.4	3.0
KY 97C-0321-02-01	13.3	68.0	2.9
KY 97C-0508-01-01A-1	13.2	67.3	3.0
KY 97C-0519-04-07	12.3	68.7	3.0
KY 97C-0540-01-03	13.2	68.6	2.9
KY 97C-0574-01-04	13.0	69.1	2.9
Merl	12.4	68.5	3.0
Milton	13.8	68.3	2.8
Pembroke	13.0	68.9	2.9
Pioneer variety 25R32	13.8	68.0	2.9
Pioneer variety 25R63	12.4	69.7	2.8
Pioneer variety 25R78	13.3	68.1	3.0
Pioneer variety 26R15	14.1	67.6	3.0
Pioneer variety 26R20	12.9	67.8	3.0
Pioneer variety 26R22	12.7	68.8	2.9
PROGENY 117	12.9	68.9	3.0
PROGENY 119	13.8	68.2	2.9
PROGENY 130	12.3	69.3	3.1
PROGENY 136	13.2	68.1	3.0
PROGENY 166	12.5	68.3	3.0
PROGENY 185	13.5	67.8	3.1
Red Ruby	13.4	68.3	3.0
SC 1298	12.4	68.6	3.1
SC 1318	12.7	67.9	3.1
SC 1325	13.2	68.1	3.0
SC 1328B	12.8	68.2	3.0
SC 1339	13.1	67.4	3.0
SC 1348	12.6	68.4	3.0
SS 520	12.9	67.0	3.1
SS 5205	13.1	67.9	3.0
SS 548	13.4	68.2	3.0
SS 8302	13.1	68.1	2.9
SS 8309	11.8	69.1	3.0
SS 8404	13.6	68.2	3.0
SS 8641	13.8	67.9	2.7
SS MPV-57	13.2	67.4	3.1
Steyer Geary	12.6	67.8	3.0
Steyer Jordan	12.9	68.6	3.0
Steyer Nofzinger	12.5	68.9	3.0
Truman	11.7	68.9	3.1
USG 3350	12.2	68.6	3.1
VA 04W-90	12.4	68.4	3.0
AVERAGE	**13.0**	**68.2**	**3.0**