Food Grade Soybean Variety Evaluation Studies

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Introduction

The ISU NE Research Farm has been evaluating food grade soybean varieties for the last six years and for the last four years has included the new 1% linolenic varieties produced by Iowa State. The past two years, the 3% linolenic varieties from other companies have also been included. The "low lin" soybeans have lower levels of linolenic acid, which reduces or eliminates the need for partial hydrogenation, a process used to extend freshness of food products and the frying life of conventional cooking oils. The level of linolenic acid determines whether it will reduce or eliminate the need for hydrogenation. The partial hydrogenation process results in the formation of trans fatty acids, that are linked to heart disease, because they elevate LDL (bad) cholesterol while lowering HDL (good) cholesterol.

Refer to prior progress reports for information on previous years' food grade soybean studies. Producers continue to need performance data to determine whether the premium offered for growing new food grade soybean varieties are adequate. Premiums are designed to cover yield drag, identity preservation cost, and the higher value of food grade soybean products.

Materials and Methods

In 2007, two ISU low linolenic varieties licensed to Asoyia and four low linolenic Asgrow varieties were compared with four Pattison Bros conventional food grade (high protein and/or large seeded) soybean varieties. The soil in the plot area for the 2007 study consisted of Clyde silty clay loam on 0–3% slopes. Soil fertility for the 2007 plot area was 19.5 ppm P2O5 (high by Bray P) and 150 ppm K2O (high) with 6.9 pH and 4.0% organic matter. The experimental design was a randomized complete block with three replications, and plots were 15 ft × 93 ft. The previous crops were corn. The studies were all in a conventional tillage system (fall chisel plowed and one spring field cultivation prior to planting). Soybean varieties were planted 1.5 in. deep on May 17, 2007 at a plant population of 189,417 plants/acre. The plot was cultivated on June 18 and sprayed on July 2 with 14 oz/acre Select, 3.0 oz/acre Pursuit, 0.125 oz/acre Pinnacle, 6.0 oz/acre Cobra, 0.25% V/V Activator 90 (non-ionic surfactant), and 1 qt/acre of 28% UAN. A second row cultivation was performed on July 7 to catch weed escapes. On July 26, the plots were sprayed with 3.2 oz. of Warrior insecticide for aphid insect control. No appreciable damage was observed due to weather, disease, or insects in 2007. The plots were machine harvested for yield on September 27.

Results and Discussion

Table 1 shows the food grade soybean varieties and the low linolenic varieties tested, soybean characteristics, yields, and bean properties. The 2006 yields are also listed if they were in the test last year. Yields for 2007 were very comparable to 2006 yields for the varieties that were present both years. The average yield for the total plot was 54.93 bushels/acre with the LSD (5% level) of 2.9 bushels/acre. The low linolenic varieties consisted of both 1% and 3% linolenic acid soybeans. There were not many 1% linolenic varieties in the plot but those present seemed to yield slightly less than the 3% varieties but within the LSD (5%). The average yield of the low linolenic varieties was 54.3 bushels/acre compared with the 55.9 bushels/acre for the food grade varieties, again less than the LSD. The linolenic soybean varieties have not had a yield drag compared with other comparable food grade varieties at

Nashua since 2004. There was variation within the low linolenic varieties. The varieties in this study indicate that the food grade varieties did not perform better than the low linolenic soybean varieties but exhibited some variation among varieties within the plot. Both the food grade and low linolenic variety yields are below the top varieties planted in the area and require farmer premiums to encourage farmers to grow them. The premium for the low linolenic varieties is usually higher than for the food grade. Seed characteristics varied, but generally the low linolenic varieties were lower in protein and higher in oil than the other food grade varieties tested. This poses a problem for marketing low linolenic soybean meal to help support premium levels paid to farmers. For the low linolenic varieties to compete in the protein market, they need to maintain a minimum protein level of 35%. There was a difference between the low linolenic varieties and the food grade varieties for oil and protein levels. As more low linolenic varieties become available to the market, the plot size will be enlarged to reflect the new offerings and a division should be made between the 1% and the 3% varieties.

Table 1. Yields of food grade and low linolenic soybean varieties.

Yield results		2007	2006	2007	2007	2007	
Variety	RM	bu/ac	bu/ac	% H2O	Protein	Oil	Variety characteristics
Asoyia 2505LL	2.5	53.0	52.5	12.5	34.73	18.60	1% linolenic
Asoyia 2525LL	2.5	52.6	52.4	12.7	34.63	18.17	1% linolenic
Asgrow 2421LL	2.4	57.8	57.6	12.3	34.80	18.5	3% linolenic, RR
Asgrow 2422VLL	2.4	55.4	NA	12.3	35.43	18.57	3% linolenic, RR
Asgrow 2521VLL	2.5	54.5	NA	12.2	35.23	19.03	3% linolenic, RR
Asgrow 2821VLL	2.8	52.4	NA	16.7	37.0	17.30	3% linolenic, RR
LL Variety	Avg.	54.3		13.1	35.30	18.36	
Pattison Bros 7319	1.9	53.9	51.3	12.6	40.13	17.20	Non GMO, food grade, large seeded, high protein
Pattison Bros 7321	2.1	51.8	51.76	12.4	39.87	17.50	Non GMO, food grade, large seeded, high protein
Pattison Bros 7522	2.2	57.8	NA	12.3	39.00	17.87	Non GMO, food grade, large seeded, high protein
Pattison Bros 7809	2.2	60.1	NA	12.1	36.03	18.40	Non GMO, black hilum, large seeded, high protein
Non LL Variety	Avg.	55.9		12.3	38.76	17.74	
Plot avg.		54.9					