# Mid-Atlantic Grain and Forage Journal

*A Compilation of*
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# PREFACE

This is the eighth edition of the *Journal*, formerly named the *New Jersey Grain and Forage Journal*. The name change reflects the fact that submissions to this journal come from researchers and Extension educators from the Mid-Atlantic region. Articles from New Jersey, Delaware and Maryland are included in this edition.

A goal of this publication is to provide summaries of research, demonstration and outreach activities to farmers and producers, industry personnel, researchers and educators. Other goals are to assist in information sharing across state borders and to increase collaborative efforts in research and extension activities. The web-based format has helped to expand the range of distribution at a low cost, something essential as dollars to support such activities has declined at most of our Land Grant institutions.

I would like to acknowledge and thank Rutgers Cooperative Research and Extension for their on-going support of this project, as well as the following people who served as reviewers for this edition: Richard Taylor, University of Delaware; Robert Kratochvil, University of Maryland; Greg Roth, Penn State University; and William Bamka, Rutgers University. Lastly, thank you to the Cook College/NJAES Resource Center for their assistance in publishing this web-based journal.

I hope that these results will be of interest and use to you. Your suggestions are always welcome, as it is our desire to meet your most important needs.

Sincerely,

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## SINGLE-YEAR RESEARCH AND DEMONSTRATIONS

# Protein Levels of Tofu-Type Soybean Varieties in New Jersey

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**Research Question**

This applied research project is part of a larger program entitled "Human Food Soybean Systems" which seeks to provide information for farmers who are transitioning from conventional agronomic production of animal feed grains into production of food grade soybeans destined for tofu, soymilk and other soyfood markets. In switching from traditional soybean varieties used for animal feed to human food, the grower has little information regarding the expected levels of protein and oil content for choosing varieties under New Jersey growing conditions. This statewide study compared three varieties of food grade soybeans to a standard soybean variety at seven sites in New Jersey to determine if there are variations in protein and oil content.

**Literature Summary**

In 1996, Ilnicki reported that food soybean variety, Iowa 3001, produced 43.9 Bu/A with 39% protein and 15.7% oil content. In 1997, Majek and Ayeni in NJ reported that Iowa 3001 yielded 51.6 Bu/A, 39.8% protein and 17.0% oil content. And, in 1998 and 1999, Singer attained yields for Iowa 3001 harvested in NJ of 49.0 and 25.6 Bu/A with protein levels of 36.9 and 36.3% and oil contents of 19.0% and 19.6%, respectively. In 1995, the Illinois Crop Improvement Association published information obtained from seven sites in Illinois about tofu quality and percent protein for food soybean varieties. The average protein content for this Illinois study was 37.4% ± a standard deviation of 2.6%.

**Study Description**

This study was conducted in three different growing zones in 2003. The southern portion included the Rutgers Research Farm in Deerfield, NJ, the central zone included the Rutgers Research Farm in Cream Ridge, NJ and the northern zone included the Rutgers Research Farm in Pittstown, NJ, among several local farms. The varieties tested were Vinton 81, HP-204 and Iowa 1007. They were planted from mid to late June in replicated strip trials. Harvest samples for each variety were randomly collected and sent to the IPG Laboratory in Champaign, Illinois for food grade analysis.

**Applied Questions**

*What were the protein levels in New Jersey and how did they compare to other states?*

The average protein for the three varieties across the seven NJ sites (13% moisture basis) ranged from 38.1% to 39.1%, with a low of 35% and a high of 41.1% (Table 1). Except for the Snyder 02 test site, there was little difference between these three varieties and the standard used at each farm site. All varieties at the majority of sites were eligible for the premium price of high protein beans (generally 38%). Protein content can be influenced by the environment which is signified by the performance of these varieties at different

locations. Variety HP-204 had the highest percent protein and was the only variety to exceed 38% protein at all sites.

| Table 1. Percent Protein (at 13% Moisture), 2003 | | | | |
|---|---|---|---|---|
| Farm Name | Soybean Cultivar | | | |
| | Vinton-81 | HP-204 | Iowa 1007 | Standard |
| Bullock | 37.6 | 38.1 | 38.4 | 38.6 |
| Cream Ridge | 38.8 | 38.6 | 39.3 | 37.6 |
| RAREC | 39.7 | 39.2 | 39.0 | 37.3 |
| Snyder | 38.8 | 39.3 | 37.8 | 37.7 |
| Snyder 02 | 35.6 | 39.3 | 35.0 | 39.5 |
| Wickoff | 41.1 | 40.9 | 39.8 | 37.5 |
| Zeng | 37.9 | 38.1 | 37.6 | 38.8 |
| NJ Average, 2003 | 38.5 | 39.1 | 38.1 | 38.1 |
| IL Average, 1995 | 37.4 | --- | --- | --- |

*What were the oil and fiber levels in New Jersey?*

Oil content ranged from 20.2 to 20.9%. Fiber content ranged from 5.04 to 5.28%. There were no significant differences between the three varieties and the standard for either of these characteristics (Table 2).

| Table 2. Average Percent Oil and Percent Fiber, 2003. | | | | | |
|---|---|---|---|---|---|
| Compositon | Soybean Cultivar | | | | |
| | Vinton 81 | HP204 | IA 1007 | Standard | Average |
| Oil | 20.2 | 20.2 | 20.5 | 20.9 | 20.5 |
| Fiber | 5.14 | 5.04 | 5.17 | 5.28 | 5.16 |

**Recommendations**

The results observed in this applied research project showed that food grade soybean varieties produced in NJ can attain high quality in terms of protein, oil and fiber that are comparable to food grade soybeans grown in other states.

It is recommended that a grower transitioning to tofu type soybeans first establish a market connection that, among other things, details the level of protein desired and if protein premiums are attached. This information will assist a grower when selecting the variety best suited for the processor. Additional years of testing are recommended to confirm the promising results indicated by this study.

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