The Center for Environmental Farming Systems

Summer 2006

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Inside CEFS

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Inside this issue:

CEFS Dedicates New Alternative Swine Unit

On Tuesday, May 9, CEFS welcomed more than 200 visitors for the dedication of the new Alternative Swine Unit. This event kicked off the CEFS *Seasons of Sustainable Agriculture* Celebration. The keynote speaker was Dr. Fred Kirschenmann, Distinguished Fellow at the Leopold Center for Sustainable Agriculture in Iowa. Dr. Kirschenmann spoke on opportunities and challenges faced by farmers in the 21st century. His message highlighted the importance of assisting farmers in identifying and taking advantage of new production and marketing opportunities. This is a focus of research, extension, and educational activities at CEFS, particularly in the alternative swine unit.

Dr. Fred Kirschenmann speaks to members of the agricultural community during the Swine Unit Dedication.

Following the dedication, visitors enjoyed lunch featuring pasture-raised pork produced locally by Mary and Nelson James. Many guests also stayed for an afternoon tour of CEFS and hoop house hog production workshop led by Dr. Morgan Morrow, the coordinator of the new Alternative Swine Unit.

Hoop houses like those at CEFS utilize a deep-bedding system that helps control odors and decreases the risk of manure runoff affecting water quality. Hoop house production also has lower fixed costs, lower cost of production per pig, and lower energy costs and provides for more pleasant working conditions for employees. Research will be conducted to determine how these advantages might be optimized while minimizing some of the potential drawbacks of hoops in North Carolina that could include more labor requirement, need for bedding, flies, and poor feed efficiency in temperature extremes, etc. Additional research will focus on antibiotic use and resistance, and alternatives to antibiotics with our unique herd that has been antibiotic free for more than 30 years. We will also conduct production and environmental quality research projects. Future expansion will include outdoor farrowing and outdoor pig production where research is needed on appropriate pasture management and rotational systems and integrated crop/animal production systems. As with all of the CEFS Units, demonstration and training will be an important component and complement the research.

Local producers take a first hand look at the farrowing pens used in the CEFS hoop houses.

From the Director

It's been a busy season in the field and a very successful *Seasons of Sustainable Agriculture* with well attended workshops and lots of new faces at CEFS. I hope you'll all join us on September 16th for the first (and hopefully first annual!) Fall Festival, a fun family event to educate the public about sustainable agriculture in North Carolina.

We are pleased to report that Chris Reberg-Horton has accepted the leadership position as the new Organic Research Unit Coordinator at CEFS. Chris, a new faculty member in the Crop Science Department, brings a wealth of experience and expertise to the position. Chris has provided an update about developments at the Organic Research Unit in this newsletter. Also, please welcome Jennifer Curtis and Sarah Morgan who are joining our group to work with the NC Choices project – they bring a lot of wonderful experience to this project. We also welcome Derek Frank who will be taking over the spiderwort manager position this month. Derek has been employed at CEFS for several summers, and we are pleased he is joining us in this new capacity.

I'd like to extend a thank you to all of you who have been involved in hosting visitors and tours at CEFS over the last several months. This outreach is an important part of our work, and based on the number of requests we've received lately, it seems our recognition as an outstanding educational resource is growing. Among the groups and individuals that have visited CEFS in recent months were Duke Professor Dan Richter and students from his advanced graduate soils course; Dawn Thilmany, the National Organic Program Leader at the USDA; environmental educators from various programs in North Carolina; Murphy-Brown Farms, interested in visiting our new alternative swine production facility; participants in the USDA-NRCS pasture ecology course; students from Sweden and the US participating in a Sustainable Natural Resources Course; agricultural scientists from Moldova; and NC State Senator Janet Cowell.

We have had some nice publicity recently, including features in the ATTRA newsletter and the most recent (August 2006) issue of Our State magazine about the RTI marketing project. On August 1, the WUNC-TV program North Carolina Now aired a story on CEFS, featuring several CEFS faculty, staff, and apprentice Cov DeRamus. The College of Agriculture and Life Sciences has also selected CEFS as one if its representative programs in a new "Welcome to NC State" video kiosk. I can't think of a better welcome to NC State!

Read on for the rest of the wonderful things happening at CEFS…

- Dr. Nancy Creamer, CEFS Director

Did you know?

CEFS is part of the North Carolina State Employees Combined Campaign (NCSECC). Through this program, state employees can select to make monthly charitable contributions through payroll deduction to one or more NCSECC organizations. All contributions are tax-deductible.

Selecting CEFS as your NCSECC beneficiary charity is a great way to support our on-going research, extension, and education programs. Campaign materials will be available this fall. Visit www.ncsecc.org for more information.

On the Ground at Cherry Research Farm

So far we have recorded over 25 inches of rain on the station this season. Though spring started off with cool, dry conditions, frequent rains will produce record yields.

The first group of antibiotic free sows and gilts farrowed on June 22, 2006. We did have some health problems and lost some of the replacement gilts prior to farrowing. The Veterinary Diagnostic Laboratory System diagnosis was PPE (Porcine Proliferative Enteritis). We currently have fifty-two weaned pigs from the first group. Eleven sows and thirteen gilts were bred on July 25, 2006. They are expected to farrow on November 18, 2006. We will continue to build the number of breeding animals from our on farm production. We are permitted for 100 sows.

At the Dairy Unit, we have received funding to replace the milking equipment. The current system will be replaced with a double 14 swing over and mid-line system. This system will have computerized cow and milking technology and give us the ability to obtain information on individual cows. It will also include a robotic sorting unit. Piedmont Agri-Systems, Inc. is the contractor installing the system. We anticipate installation during August/September.

Wayne County leadership is working to develop an Agriculture Resource Center facility to support programs with the Wayne County Cooperative Extension, CEFS, Cherry Research Farm, NRCS and FSA. The county is interviewing Planners to help determine space requirements and facility design before hiring an engineering firm. All of the agencies will have an opportunity to provide input.

We continue to have constant monitoring of the farm for Tropical Spiderwort. NCSU and NCDA&CS have staff that survey fields and borders in search of new seedlings, and any plants found are destroyed. Plant Industry has also fumigated several fields on the farm, including field C2.

- Eddie Pitzer, Farm Superintendent

CEFS to Host 6th Mid-Atlantic Dairy Grazing Conference

The Mid-Atlantic Diary Conference will take place October 31 – November 1 in Goldsboro. CEFS will serve as the site for conference activities on Tuesday, October 31. The conference will feature research highlights from recent work at the CEFS Dairy Unit with our ~180-cow fall-calving pasture-based system which includes Holsteins, Jerseys, and reciprocal crosses between those breeds. We are just completing a 3-year trial with 2 groups of 40 cows stocked at either 1 cow/acre or 1.5 cows per acre.

The conference will provide information on production, reproduction, economics, parasite control, indicators of health and immune function, milk flavor differences from pastured cows, among other topics. Though not focused on organic dairying, the conference will include several topics relevant to organic dairy production. A group of dairy genetic researchers from several states will be joining dairy graziers for Tuesday afternoon festivities to discuss crossbreeding work in progress since 1998. Dr. Ben McDaniel set up this work as a planned criss-cross system in which pure lines of Jerseys and Holsteins could be maintained along with crosses varying from ¾ Holstein to ¾ Jersey in a planned mating sequence.

Dr. Steve Washburn discuses unique feature of the CEFS dairy with visitors on May 9.

We will start the conference on Tuesday morning with optional tours of CEFS facility, including various studies and cropping systems, swine, and beef units. The afternoon will feature a keynote talk from Mr. Gary Zimmer of Mid-Western Bio-Ag. Gary is an organic producer, biological farmer, and author from Wisconsin. In addition to research topics, the afternoon program will include a tour and overview of management of the Dairy Unit, which will be in the middle of the fall-calving season.

On Wednesday, November 1, we will meet all day in Goldsboro at the Wayne County Agriculture Center for various presentations and discussions. Topics will include facilitating smooth farm transitions to the next generation, alternative management systems, and discussions featuring experienced dairy graziers will highlight the second day's events.

Two research projects from recent studies at CEFS were presented at the American Dairy Science Association's 100 anniversary meeting in early July in Minneapolis:

1. "Breed differences in postpartum cyclicity of pasture-based dairy cows." C. M. Williams, S. P. Washburn, A. N. Elias, and C. S. Whisnant.

In this work, Christina Williams reported that Jerseys and crosses of Jersey and Holstein started cycling sooner after calving and had higher fertility than Holsteins. Milk production was highest in Holsteins followed by crossbreds and Jerseys. Further analyses will be conducted to determine the relative economic merit of crossbred versus purebred dairy cows.

2. "Evaluation of chemical properties and consumer perception of fluid milk from conventional and pasture-based production systems." A. E. Croissant, L. Dean, S. Washburn, and M. A. Drake.

In this study, Adam Croissant reported that milk from Jersey and Holstein cows consuming pasture differed in flavor, sensory indicators, and fatty acid profiles compared to similar cows fed a total mixed ration. However, consumer preferences did not differ in that both types of milk were deemed acceptable.

- Dr. Steve Washburn, Dairy Unit Coordinator

New Publications

Forehand, L. M., D. B. Orr, and H. M. Linker. 2006 Evaluation of a commercially available beneficial insect habitat for management of Lepidoptera pests in organic tomato production. Journal of Economic Entomology 99(3) 641-647.

Raupp, J., C. Pekrun, M. Oltmanns, U. Köpke (Eds). 2006. Long Term Field Experiments in Organic Farming. ISOFAR Scientific Series No 1. Verlag Dr. Köster, Berlin, Germany. This book contains a chapter on the first five years of the Farming Systems Research Experiment at CEFS.

Kristiansen, P., A. Taji, and J. Reganold (Eds). 2006. Organic Agriculture: A Global Perspective. CSIRO Publishing, Collingwood, AUSTRALIA. Includes a chapter on no-till, organic production co-authored by Dr. Nancy Creamer and Dr. Ron Morse of Virginia Tech.

Congratulations to Recent CEFS Graduates!

Lisa Jackson: Master of Science, Entomology

Mary Kroner: Master of Crop Science

Brooke Whitting: Master of Science, Entomology

Small Farm Unit Bustling with Activity

This has been quite a spring and summer for the Small Farm Unit (SFU). An ongoing discussion by a broad stakeholder base is in the process of reviewing the mission, goals, and strategic plan for the production and educational outreach components of the SFU. It is an exciting and formative time as we honor the past and set a course for the future. That said, programming, production, research and demonstrations are still underway at the Small Farm Unit.

As we mentioned in the winter newsletter, the extremely successful Discover Ag Program from NC A&T at Greensboro was started at CEFS this spring. One-third of all Wayne County third graders from fifteen classes at six elementary schools participated. Additionally, four of the six Wayne County FFA Chapters sent support staff to assist with the program. In response to our initial success, we are submitting proposals for a second spring of Discover Ag for third grade and the possible addition of a fall Discover Ag for fifth grade. The overall goals of the Discover Ag program are to strengthen students' understanding of sustainable agriculture, to integrate with and reinforce the NC Standard Course of Study goals and objectives, and to improve learning as reflected by the North Carolina standardized science testing for third and fifth grades. Initial research using pre- and post- testing indicated an increase in student performance as a result of this program.

Wayne County third graders discovered agriculture through a number of hands-on activities at the Small Farm Unit this spring.

The SFU continues to demonstrate and evaluate a large number of production techniques focused on organic farming systems for small scale growers. Bryan Green, along with Megan Riley and apprentices Cov DeRamus and Anna Shapley-Quinn, manage the farm's production units for field days, outreach, and extension activities. These demonstrations offer a wide array of platforms that our visitors can observe and learn from. Current demonstrations include:

- Organic production of over 100 varieties of fruits & vegetables
- Pastured poultry
- Intensive rotational grazing of goats
- Summer cover cropping strategies
- Terraced hillside farming

A view of the Small Farm's integrated crop-animal system.

- Relay cropping systems following cool season annual vegetable production
- Weed control by rolled rye/crimson clover in melons, squash, and cantaloupe
- Strip cultivation of tomatoes, peppers, and eggplant in rolled rye/crimson clover

The SFU has increasingly provided a platform for research. Currently, research on grafted tomato, beneficial insects, biointensive agriculture, and variety trial research is in place. For the future, NC A&T has submitted a three year proposal for summer cover/fall and spring no-till vegetable production research. NCSU also has graduate work in the area of summer cover crops.

High tunnels research will be strengthened as Mary Peet (NCSU) and Frank Louws (NCSU) were awarded a three year SARE grant to construct and conduct research in four high tunnels primarily with tomatoes. Two other funded grants are going to bring two additional demonstration high tunnels. One demonstration tunnel will be a single poly covered movable tunnel; the other, a non-moveable tunnel, will have a double poly covering for added insulation and winter heat retention. These two demonstration tunnels will provide information and outreach opportunities in winter production of various greens and season extension of tomatoes, eggplants and peppers. Within these demonstration tunnels, Steve Moore (NC A&T) and David Orr (NCSU) will be monitoring insect and disease concerns and the interior microclimate of high tunnels.

The SFU has joined heavily in celebrating our first decade with the CEFS *Season of Sustainable Agriculture* events. Eleven of the fifteen events have been or will be hosted at the SFU. The remaining events will focus on summer cover crops, no-till planting, season extension and high tunnels production—please register and join us. These events, along with the increase of local visitors and from visitors as far away as Sweden and Moldova, have added visibility and recognition for CEFS and the SFU.

- Bryan Green, Small Farm Manager
- Steve Moore, Extension Associate

Beef Unit Update

So far 2006 has been a mixture of the good and the bad at the CEFS Beef Unit.

We started the year with a tough calving season and excessive early calf losses. Some of those losses were due to dystocia, but there were a number of weak calves that simply "failed to thrive". We don't completely understand what happened, but are still working on it. Dr. Mark Alley, our new Extension Cattle Veterinarian, has been working on the investigation, and while we have not pinned down an exact cause, we have found several issues that we can work on for next year.

The breeding season, which occurs during April and May, went smoothly. We typically synchronize estrus in the cows and then breed them using artificial insemination once, after which we turn out cleanup bulls. This year we used a little different program for our first calf heifers in which we synchronized using CIDRs, and then bred only when heat was observed. The heifers responded well to synchronization (28 of 33) and those that were bred AI settled well (18 of 28 or 65%). We did not do as well with our mature cows which were bred using the Co-Synch timed breeding protocol. We bred 82 cows and only 28 settled, or 34%. Historically, we have settled about 65% using the same protocol.

This year the mature cow herd was bred either to Angus bulls or Braunvieh bulls, a new project for us. For the past 8 years we have bred half of the mature cows to Senepol bulls and the other to Angus bulls. Our work with the Senepol bulls has been very interesting, but it is time to move on and focus on the staying power of the Senepol-sired cows. The use of a third breed keeps us active in one of our key interest areas - the value of crossbreeding. Braunvieh is an old German breed that is thought to have traits complementary to an Angus-based cow herd.

Cool weather in April and May was very good for our ryegrass crop, which continued to grow aggressively longer than we would normally expect. In most years we cut the ryegrass in late May and plant our summer annuals, but this year we were well into June before doing so. The crabgrass crop was slow to come along due to competition from the ryegrass, and we expect see the lowest crabgrass productivity in recent years.

Steers from the 2005 calf crop that were finished at the Butner Beef Cattle Field Laboratory went to harvest in Pennsylvania in late June, and, as we have seen in the past, these are very good quality cattle that fit well into industry specifications. Average age at harvest was 16 months. Carcasses averaged 730 lbs, had 0.47 inches of backfat, a 12.6 square inch ribeye, and a yield grade of 2.9. Of the 40 steers harvested 3 graded prime, 34 choice, and 3 select. On the yield grades we had 2 - #1s, 26 - #2s, 10 - #3s, and 1 - #4. Average value of the carcasses was $1.29/lb after shipping, grading, and marketing costs were subtracted, which calculates back to a net live value of $0.80/lb. We are pleased with the uniformity of quality we are seeing in these cattle. As we have observed in the past, the ½ Senepol calves were slightly lighter at harvest and had lower marbling than the Angus sired calves, but in general the Senepol-sired steers were still desirable cattle.

-Dr. Matt Poore, Beef Unit Coordinator

NC Choices Welcomes New Project Staff

The NC Choices program has welcomed two new members to the CEFS staff. Jennifer Curtis of Curtis Consulting, Inc. has joined CEFS as the new Project Manager, and Sarah Morgan will serve as the Training and Technical Services Coordinator for the project. Funded by the Kellogg Foundation, NC Choices is increasing consumer demand and providing farmer technical support for pasture-raised, organic and/or antibiotic-free pigs.

Jennifer comes with a wealth of experience in managing projects related to agriculture and the environment. Her client list includes NCSU, University of Wisconsin, Gerber Products Company, World Wildlife Fund, NRDC, and the National Council of Farmer Cooperatives. She received an M.S. in Environmental Sciences & Engineering from UNC's School of Public Health in 1999. (For more information about Jennifer and Curtis Consulting see www.curtis-consulting.com).

Jennifer Curtis

In her position, Jennifer will focus on coordinating a diverse mix of project participants, facilitating the development of NC standards for outdoor pig production, and creating a direct market initiative to help build consumer awareness and demand for sustainable pork production. Additional project components will include providing NC Choices farmers with technical support and addressing small scale, niche-market processing needs. Notes Jennifer, "I am really excited about working with the caliber of partners CEFS has assembled for this project. There is a tremendous opportunity to facilitate the growing demand for sustainably-raised pork in North Carolina, and I am hopeful our work together can overcome some of the challenges before us."

Sarah comes from an extensive background in international food animal production. She recently served as a US Peace Corps volunteer in Ecuador developing vaccination and parasite control programs in rural communities and provid-

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Organic Research Unit Update

The Organic Research Unit continues to make plans for its new location. Since the devastation of Hurricane Floyd, the unit has not had a permanent home. As we plan where and how we want to operate, we are carefully documenting our process. We will use that documentation to create a how-to manual for other research stations that want to have certified organic research land. The demand for organic research has exploded statewide, and several research stations are interested in adding certified organic land. Here is a sampling of our activities so far.

For our new site we have selected five fields near the shop and conference facilities at CEFS. We are now in the process of deciding which parts of these fields will be managed organically. The Natural Resource Conservation Service has committed itself to helping with this process by conducting a soil survey of the site. The survey will be invaluable in locating research blocks, beneficial habitats, and grass waterways. Part of our decision-making is deciding which areas are best for vegetable crops, and where future irrigation can be installed. We also want to designate a transitional research zone, where land will be managed organically except for occasional conventional treatments that are part of a research plan. This land will not be certifiable, but will nonetheless serve as a rare resource for researchers interested in studying methods for transitioning to organic.

Participants at a July 11 Workshop learned about options available for weed management in organic grains through lectures and field demonstrations at CEFS.

We decided on a rotation of soybeans, crimson clover, corn, perennial hay and canola. The rotation combines perennial and annual crops to improve weed management and soil quality, prevent labor crunches at the farm, and provide a diversity of crops that researchers could choose to precede their experiments. One of the most exciting opportunities at the new site is the ability to plant habitat for beneficial insects around the perimeters of each field. Entomologists David Orr and Mike Linker are planning a study to look at the long term impact of these habitats.

We have hosted several field days at CEFS this summer related to organics and more are planned. On July 11th, the Weed Management in Organic Grains workshop was held. Dr. David Monks gave a presentation on cultivation equipment, Dr. Katie Jennings discussed her research on natural herbicides, George Place presented on soil moisture interactions with rotary hoes, and I talked about how cultivation compares with herbicides in terms of economics, energy use and soil erosion. On July 17th, Dr. David Orr and Dr. Mike Linker hosted a workshop on beneficial insect habitat and release strategies.

As always, please let us know what you think is most needed in organic research and extension. We maintain a database of suggestions so that when researchers and educators ask us what needs to be done, we have something to show them. A discussion session after our July 11th workshop yielded some great new thoughts on future directions for organic research at CEFS. We heard strong interest in reducing tillage in organic systems. Does that spark your interest as well? Please let us know by emailing chris_reberg-horton@ncsu.edu.

-Dr. Chris Reberg-Horton, Organic Research Unit Coordinator

New NC Choices Staff (con't)

ing technical training to both Ecuadorians and fellow Peace Corps volunteers. She has also provided technical assistance to swine farmers in Kazakhstan through the international farmer-to-farmer program at Winrock International. Sarah has her BS in Animal Science and MS in Crop Science from NC State University where she focused on the animal-grass relationship.

Sarah Morgan

As Training and Technical Services Coordinator, Sarah will provide technical support to the small, independent farmers raising hogs on pasture who participate in NC Choices direct market initiatives. She will also implement extension training workshops on pasture-based hog production. Sarah will serve as the primary resource for NC Choices farmers and be responsible for developing model farms in three distinct regions of North Carolina (Mountains, Piedmont, and Coastal Plain).

Information about NC Choices is at www.ncchoices.com.

One of five hoop houses at CEFS' new alternative swine unit.

No-till Methods for Organic Systems

One of the most challenging research objectives for organic cropping systems is to maintain effective weed control while at the same time reducing tillage. Weed control in organic systems is heavily dependent on innovative cultivation methods or on weed-smothering mulches. Small vegetable operations can often implement effective mulching to suppress weeds, conserve moisture and add organic matter. These same techniques are much more difficult to implement on a large scale mainly because of the labor requirement. Large scale organic operations have traditionally relied on the timing of various cultivation methods for adequate weed control.

Smother Crop Species

Recently we have been attempting to work out a system for routine use of conservation tillage methods for our organic cropping system on the farming systems research unit (FSRU). The main idea is to grow cover (smother) crops that can serve the same purpose as hand applied mulches. Our objectives are to evaluate several cover crops for use in organic conservation tillage systems. These include:

- Rye (*Secale cereale* L.)
- Rape (*Brassica, napus* subsp. oleifera)
- Crimson Clover (*Trifolium incarnatum* L.)
- Summer annual grasses (mainly *Sorghum bicolor*)

Using the roller/ crimper on a rape cover crop

These cover crop mulches may have multiple properties such as the ability to produces large amounts of biomass, "allelopathic" weed suppressive properties, and biological N fixation. For example rye, sorghum and rape are known to possess allelopathic compounds, crimson clover is a N fixing legume, and rye and sorghum are capable of producing very large amounts of biomass.

Methods of Kill

A key step in the process is the ability to kill the smother crop at the precise time that is in synchrony with sufficient biomass for weed control and at the ideal planting date for the main crop. If this step is out of synchrony the whole system may not work. The idea is to be able to accumulate enough biomass of the smother crop for weed control and then be able to effectively kill and configure the smother

Preparing to undercut previously rolled rye

crop for no-till planting of the main crop at the best time. All of these smother crops are annuals that begin to die as they mature and become reproductive which aids the mechanical kill methods. Some of the methods of kill we are evaluating include:

- Flail mowing
- Use of a roller/crimper
- Undercutting
- Combinations of the above

View after no-till planting corn into a rolled rape smother crop

To date we have observed that the ability to kill the smother crop at the desired stage is critical to success, and it often seems that combinations of kill methods are necessary. Also no-till planter adjustments that allow for penetration and removal of residue so that seed can be placed properly is a must. This year was the first year we had used rape as a cover crop and although it seem to do a good job of suppressing weeds, we found it particularly difficult to kill.

- Dr. Paul Mueller, Farming Systems Unit Coordinator
- Melissa Bell, FSRU Research Associate
- Ken Fager, Research Technician

The CEFS website has a new look!

www.cefs.ncsu.edu

Content suggestions, contributions & corrections may be sent to cefs_info@ncsu.edu

Food Grade Soybean Tofu Yield and Seed Composition

Background

There is increasing interest among North Carolina crop producers to capture the profitability offered by the certified organic market. In the organic industry there is a large demand overseas for food grade soybeans but farmers in our state have not yet considered which varieties to grow. Current popular cultivars in food soybean markets are of very short maturity and may not perform well in the southeast U.S. The longer season attainable in North Carolina should generate interest in other longer maturity varieties.

Food grade soybeans vary in their potential to produce soymilk and tofu. The objective of this study was to evaluate the tofu yield and seed composition of food grade soybean cultivars grown at a single location in North Carolina in 2005. This was done to provide market potential information for prospective growers and future providers of contracts. The soybean cultivars in this trial were grown on land dedicated to organic management at the Center for Environmental Farming Systems on the Cherry Research Farm in Goldsboro. The cultivars included commercially available organically produced food grade seed, a short maturity food grade cultivar popular in the organic industry, and a food grade experimental cultivar not yet available to growers.

Food grade varieties, maturity groups and seed sources

Vinton 81 Group I, Albert Lea Seed (MN)

NC+ 36YP6 Group III, Blue River Organics (NE)

Ohio FG4 late Group III, Ohio Foundation Seeds

Ohio FG5 Group IV, Ohio Foundation Seeds

NC+ 41YP5 early Group IV, Blue River Organics (NE)

NC+ 43A7 Group IV, Blue River Organics (NE)

NC+ 52Y6 Group V, Blue River Organics (NE)

R1705 Group V, K&K Farm Service (AR)

N01-10974 Group VI, experimental (USDA-ARS, NCSU)

Method

The soybeans were inoculated prior to planting with Nitragin (Optimize) at a rate of 4.25 ounces per 100 lb of seed. The cultivars were planted with a 4-row planter on May 24 in 30" rows with four replications in a randomized complete block design. Each variety strip was 8 rows wide and approximately 200 feet in length. Evaluation for early growth vigor, crop canopy development, grain quality, standability and yield was given in a previous report (CEFS Winter 2006 newsletter). This report describes the tofu making method used, the resulting tofu amounts, and the seed compostition from samples saved from four field replications.

Soybean seed composition was made available by Joe Burton, Research Agronomist, USDA-ARS. Samples were submitted for NIR analysis which uses light spectra to look through grain and interpret its compositional value. Analysis was done for oil and protein content.

The tofu making procedure and equipment were made available by Tommy Carter, Research Geneticist, USDA-ARS.

The lower seed quality of the NC+ 36YP6 soybeans (right) grown at Goldsboro result in the off-white color of the tofu compared to N01-11118 (left).

Tofu Yield and Quality Measurement

1. Weigh out 70 g of dry seed, rinse with distilled water, place in beaker and cover with water approximately 4 inches above the top of seed. Allow the seed to soak overnight.

2. Drain and rinse soybeans with distilled water. Remove excess moisture by passing soybeans on to dry paper towels at least four times. Record weight of seed.

3. Weigh out 100 g seed. Add 250 ml distilled water. Grind in a power blender on low setting for 4 minutes. Add 125 ml water to the slurry. (If slurry is present on underside of blender cap, use the 125 ml of water to rinse off the cap into blender) Filter through 8 layers of moist cheese cloth. Gently squeeze the cheese cloth 4 to 5 times after draining into funnel to add soymilk remaining in cheesecloth. Discard the sludge and keep the soymilk.

4. Simmer the soymilk for about 10 minutes and watch the heating closely (The soymilk can quickly boil over). When soymilk reaches boiling point (approximately 91°C), it will foam. Take soymilk away from heat immediately. Simmer 10 minutes more.

5. When soymilk temperature is exactly 80°C, add 10 ml of prepared coagulant and shake well. (The coagulant is a suspension of 20% magnesium chloride in water. Calcium chloride may be used, however, concentration may have to be adjusted.)

6. Transfer the contents of flask to wooden box (approx. 4"x 4"x 4") lined with moistened muslin cloth. Squeeze water out sufficiently so that lid can placed on the wooden mold and pressure applied. Keep pressure on tofu for 20 min-

(continued on next page)

Food Grade Soybean (con't)

utes. (Use approx. 2.2 lbs p.s.i.)

7. Remove tofu from mold and weigh. Transfer to container and store under water.

Results and Conclusions

Mean tofu yields were significantly different at the 1% level of significance with an F test = 3.5 (Table 1).

NC+ 36YP6 and Ohio FG4 were among the cultivars with highest grain yields. Together with Vinton 81 as a group, they yield more tofu than the other cultivars. Being in maturity group III, NC+ 36YP6 and Ohio FG4 should be more attractive to growers than Vinton 81 for North Carolina growing conditions. However, NC+ 36YP6 may no longer be available for seed in 2006. Equivalent to Ohio FG4 in both grain yield and tofu yield in this study, Ohio FG5 would be the alternate choice if Ohio FG4 in turn became unavailable. Ohio FG5 may yet be a stronger consideration if an additional criterion of high protein content is desired in selecting a food grade soybean. The maturity of Ohio FG5 would also make it a more likely choice for a food grade soybean to be grown in North Carolina.

Caution should be exercised in any case as these are the results of a single year at a single location. Growing conditions were not ideal in the Goldsboro area in 2005 for optimum production of soybeans.

This project was supported in part by a grant from the North Carolina Crop Improvement Association. Assistance in providing temporary laboratory space, equipment and information on tofu production methodology was provided by Dr. Tommy Carter, research geneticist, USDA-ARS. Assistance in seed analysis was provided by Dr. Joe Burton, research agronomist, USDA-ARS.

Table 1. Tofu yield and % oil and protein on a dry weight basis of food grade soybeans grown organically in 2005 at CEFS.

Variety	Tofu Yield (g/g dry seed)	Oil (%)	Protein (%)
NC+ 36YP6	2.29 a	20.8 bc	45.9 bc
Vinton 81	2.20 ab	20.7 bc	45.5 bc
Ohio FG4	2.15 abc	20.7 bc	44.8 c
Ohio FG5	1.93 bcd	22.5 ab	47.0 abc
NC+ 52Y6	1.93 bcd	20.6 bc	48.7 ab
NC+ 41YP5	1.89 cd	22.8 a	49.1 ab
N01-10974	1.89 cd	17.3 d	48.6 abc
R1705	1.88 cd	20.2 c	50.0 a
NC+ 43A7	1.74 d	24.1 a	49.1 ab
lsd (.05)	0.286	1.89	3.91

- Dr. Phil Rzewnicki, NCSU Dep't. of Horticultural Science

Upcoming Events in Sustainable Agriculture

August 14: Organic Certification Mini Course. 10 am—3 pm. $50. Center for Environmental Farming Systems. More info: www.cefs.ncsu.edu.

August 21: Small Farm Equipment and Cover Crop Workshop. 1—5 pm. Free. Center for Environmental Farming Systems. More info: www.cefs.ncsu.edu.

September 16: CEFS Fall Festival. 10 am—4 pm. Free and open to the public. More info: www.cefs.ncsu.edu.

September 18: Season Extension of Vegetable Crops Workshop. 6—8 pm. Free. Center for Environmental Farming Systems. More info: www.cefs.ncsu.edu.

September 19: The Future of Food screening. 7-9 pm. Free. Millbrook Exchange Park.

September 21, 2006: CFSA Farm Tour Kick-Off at Whole Foods Raleigh.

September 22-23, 2006: First Eastern Triangle Farm Tour sponsored by Carolina Farm Stewardship Association (CFSA). Website: www.carolinafarmstewards.org.

October 16, 2006: High Tunnel Greenhouse Production Workshop. 6—8 pm. Free. Center for Environmental Farming Systems. More info: www.cefs.ncsu.edu.

October 27-29, 2006: Sustainable Agriculture Conference, Spartanburg, SC. Website: www.carolinafarmstewards.org.

October 31-November 1, 2006: Mid-Atlantic Dairy Grazing Conference, Goldsboro, NC. More info: www.cefs.ncsu.edu.

Seasons Workshops Draw Large Crowds to CEFS

2006 is a landmark year for CEFS - this year marks our 10th year of programming! To celebrate our achievements in research, education, and extension over the last 10 years and to look forward to a future of continued innovation and leadership in sustainable agriculture, we're having a season full of events.

The *Seasons of Sustainable Agriculture* celebration officially began on May 9, 2006 with the dedication of the new swine unit at CEFS (see page 1). Another important part of the *Seasons* celebration is a series of 13 educational workshops for producers, extension agents, other agriculture professionals, and consumers.

More than 200 producers, extension agents, agricultural professionals, and students have participated in the 8 educational workshops held in May, June, and July. Every workshop has received an overall positive evaluation from attendees, with most reporting they learned something new at the workshop they will apply on their farm or in their work.

In addition providing the opportunity to share CEFS research and expertise with the agricultural community, the workshops have also drawn many new faces to CEFS. We've worked hard to promote the workshop series to new and diverse audiences through partnerships with county extension offices, the Department of Environmental & Natural Resources, and the Carolina Farm Stewardship Association as well as the North Carolina Certified Crop Adviser program and a new CEFS email list serve. Currently, 350 people receive regular notifications about upcoming events at CEFS, and the list keeps growing!

If you haven't attended a workshop this season, there are more workshops scheduled for August, September, October, and December. See page 9 for topics and dates of upcoming workshops.

Another can't miss event this season—the first-ever CEFS Fall Festival! The Festival will include educational exhibits on sustainable agriculture and local food systems, fun activities for children of all ages, farm tours and demonstrations, and great food. There will also be live music all day, including local bluegrass bands Constant Change and the Back Porch Boys. The Festival is free and open to the public.

- Denise Finney, Seasons Coordinator

Thank you *Seasons of Sustainable Agriculture* Sponsors!

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Inside CEFS is edited by Denise Finney, denise_finney@ncsu.edu. The next edition will be published in November 2006; the submission deadline is October 10.