

Trip to Africa 2004
South Africa and Mozambique
Ralph Waniska

19-20 June – Drove from home to IAH; flew from IAH to ATL and on to South Africa. Dr. Minnaar (Amanda (h) 991-3976 / (w) 420-3239) and husband (Francios) picked me up from the airport and delivered me to the hotel (Unibrooks 362-9799 27-12-362-0779 izetteo@absamail.cos.za). I had dinner with Dr. JRN Taylor (phone (h) 993-1774) and his wife (Jan) and two of their daughters, Alice and Megan [Emma was in the USA] and Daniel (boyfriend of Alice).

21 June Mon – met with Drs. Amanda Minnaar and Louis Pelembe and Ph.D. student Agnes Mwangwela. We discussed the scanning electron microscopy (SEM) pictures of the two cultivars during processing. I received a draft of a manuscript that included many graphs and SEM photos. After much discussion I began to understand that soaking to 40% moisture content was a good target. This permits the evaluation of the short hydrothermal process to determine the chemical, physical and structural changes that could occur prior to micronizing, during micronizing, during subsequent soaking, and regular cooking of the modified cowpeas.

We discussed who has been identified from Mozambique to be post-graduate students at the University of Pretoria. Brazalini Ubisse (currently completing his Honors program studies with Dr. Leda Hugo) and Richardo Macia (from INIA, an agronomist that has volunteered to study food science and return to INIA to establish a section of food science and technology) were named by Dr. Pelembe to begin their “bridging” studies in the second week of July 2004. I indicated that funding for these students was in the budget for UP but the carry forward funds may not be there, depending upon the number of students currently being supported at the end of the fiscal year.

22 June Tue – Checked out of Unibrooks B&B (27-12-362-0799, 083-2920603, email: izetteo@absamail.co.za). I continued meeting with Amanda, Louis and Agnes. We traveled to Johannesburg to see and discuss micronization activities. We were met by Greg Farinha (Managing Director, Techmach Technology (Pty) Ltd, 10 Nichols Street Chamdor, Krugerdorp, South Africa, POBox 4163, Luipaardsvlei 1743, phone 27-11-762-1091/2/3 email: greg@techmach.co.za) and Corrie Cronje (Marketing Director, corrie@techmach.co.za) . We had a short discussion, video and a tour of their manufacturing and processing facility. We saw equipment to receive grain, clean, destone, aspirate and package clean grain. We saw some of the debris that was in the grain and some of the moldy grain that was removed. They also had a micronizer set up and processing large corn grits. There was a small tempering bin before and after the micronizer. There were flaking rollers after the post-tempering bin. The short time (not measured) high heat process made the grits more “plastic” to the bite by the teeth, after rolling the thick flake was partially cooked. Placing these flaked corn grits into a cup of steaming hot water completed the cooking of the corn. We discussed the critical needs of tempering before processing. Corrie mentioned the Vibratory equipment that Satake manufactures and that they represent/sell. They explained that water is assisted by this vibratory device to enter and equilibrate very quickly. After the demo, we talked about

possible interactions of our research group and their company. It is possible that this company will sponsor a post-graduate student to determine the proper conditions to process cowpeas and beans to achieve desired food products. In the afternoon I talked to Dr. Minnaar and Agnes Mwangwela about the research they have conducted. We saw more pictures of cowpeas at different stages of processing. In the evening I checked into the Protea Manor Hotel (phone 362-7077, PO Box 14334, Hatfield 0028, South Africa mphotel@satis.co.za Pretoria).

23 June Wed – We continued discussing the economic realities of conducting research in South Africa and Mozambique on either a reimbursement basis or forwarding a fixed advance amount. I need to convey to Joanie Birdwell the concerns and request to facilitate money transfers (more easily). We acquired the ingredients to prepare badgia and samp and beans. A commercial premix was in the grocery stores using cowpeas as the base. This was compared to soaked and ground cowpeas, and to the two micronized flours processed at the Canadian company of InfraReady: 125C no added water OR 125C with 18% moisture. The 125C with 18% moisture whole cowpeas were boiled with the micronized corn grits that were prepared the previous day at Techmach Technology. It became clear that the micronized cowpeas from Canada were only slightly modified. The flour had a “green” taste and the whole cowpeas remained “hard” after 30 minutes cooking. The whole micronized cowpeas required more than 45 min to cook. The commercial product (consumed as a fried ball) was a little dry, indicating that more moisture should have been added during processing. The soaked native cowpeas were not ground fine enough to make flour that could be whipped to hold air. This product tasted pretty good, much better than the two samples prepared from micronized flours (that tasted uncooked). Agnes tried using a lower oil temperature to fry the dough. These samples tasted better, more cooked, supporting the concept that the InfraReady samples were not processed sufficiently. Hence, it is likely that minimally micronized cowpeas will not have the desired functional properties. Either more water and/or longer tempering time and/or higher micronization temperature must be evaluated. It is not known how long the moisture must be present to achieve the desired modification during micronizing.

24 June Thur – discussed the eastern Africa sorghum food utilization project with Dr. JRN Taylor (Dept. Food Science, University of Pretoria, 0002 Pretoria, South Africa, phone 27-12-420-4296 fax 27-12-420-2839, email jtaylor@postino.up.ac.za). We discussed research areas that were different than current, built upon our strengths, and would have impact that could be documented in the several year time-frame.

Additional discussions occurred with Dr. Minnaar concerning the budget exchange rate and the timely reimbursement of expenditures. The concerns of Dr. Pelembe were expending all the funds to get to a zero balance causes problem with the bank and additional fees are assessed. The timing of the advances and length of time to get signatures, decreases the annual spending for the project.

We talked about the protein and starch data that Agnes had determined. We tried to delineate which tests Agnes should conduct to characterize the proteins and starch functionality during processing. Dr. Robert Young (Promasidor (South Africa)(Pty) Ltd.)

joined us and talked about what he was doing with Promasidor. He also asked about all the people he knew while being a Ph.D. student in College Station.

25 June Fri – I was able to send files to Joanie Birdwell from Dr. Minnaar's office to document the effect in the exchange rate on project activities. I was also able to sit in on two student's presentations of their proposal presentations and a weekly meeting of all the faculty, staff and graduate students for "Tea and Bread." I was pleased with both concepts. The students presented material in a short literature review, general problem, what is the question being researched, and statement of objectives before the methods, research strategy and GANT charts were presented. The first student presentation was by Rosemary Lekalake (who earned a M.S. degree from TAMU 11 years ago). Her project was on the perception of bitterness and astringency in sorghum and cowpeas. The second presentation was by Silvia (?) on the sensory and functional properties of microwave processed whole egg. Both students had problems stating the problem, question and objectives. The advantage of having a proposal "defense" is obvious for the student; the faculty, staff and other graduate students also benefit by knowing what each student is doing. The similarities and differences in research projects in different commodities, processing procedures and research perspectives will be known by more and able to be utilized in everyone's thinking and research activities. The weekly meeting provided a chance to update the past achievements, current activities and future conferences and opportunities. The consumption of food product and a beverage facilitated the coming together and open discussion.

26 June Sat – checked out of the Protea Hotel, took a taxi to the Brooklyn Guesthouses (Brooklyn Guesthouses phone 012-362-1728, email: info@brooklynguesthouses.co.za 128 Murray St., Brooklyn, Pretoria Vat No. 4840193975), and met with Agnes Mwangwela to draft a one page abstract for an SEM Conference in South Africa on 30 Nov-2 Dec, 2004. We also observed more research data and discussed approaches to complete the research for the Ph.D.

27 June Sun – I was able to write some of this report in the morning before traveling to Johannesburg and on to Maputo.

28 June Mon – Met with Dr. Louis Pelembe (Louis Pelembe home phone 417-695 , mobile 082-486-421 Leda Hugo phone (o) 09-2581-493-881), Ana and Eduardo (honors students). We were shown results of trials using the hot air popcorn popper and cooking trials. A sample of mixed cowpeas were soaked for 8 hours [the increase in moisture content was mostly linear until 8 hours of steeping; then was at a maximum] and processed immediately after draining and wiping with a paper towel. The cowpeas were heated for 1, 2, or 3 min. The soaked and heated cowpeas were immediately [between 3-10 minutes later] placed in a pot and boiled. The cooked cowpeas were probed with a wire to determine softness during cooking. The time to cook unsoaked cowpeas was affected by heating. One or 2 min heated cowpeas had shorter cooking times than did the 3-min heated treatment. Presoaking increased the time the cowpeas could be heated in the hot-air popcorn popper. The 3-min heated dry cowpea looked and smelt burnt. The cotyledon was uniformly dark brown to black; no light color tissues were present.

We prepared another set of processed cowpeas in the late morning and afternoon. We separated and soaked cowpeas for 2 hours. The cowpeas weighed about 20 g before soaking and about 30 g after 2 hours soaking, i.e., about a 50% increase in weight. We then thermal processed the cream cowpeas (the one with the 4 duplicates) for 90 seconds. This sample adhered to the sides and bottom of the inside of the hot-air popcorn popper. I decided to shake the whole unit to limit the adhesion of the soaked cowpeas to the metal surfaces. After 90 seconds many of the cowpeas had made “popping” sounds. I decided to process this sample for 60 and 120 seconds. We repeated the 90 second treatment, since the heating unit appeared to function differently after it warmed-up. We processed the white, black and speckled cowpeas for 90 sec, too. The processed cowpeas were placed in a room with circulating air to facilitate drying overnight.

29 June Tue – I continued to work with Ana and Eduardo (honors students with Dr. Pelembe). We conducted cooking trials with the samples that were prepared the previous day. We used tap water in the Mattson cooker that was provided to Dr. Pelembe from a Swedish University professor. We did not add too much water to the 15 liter pot [20 liter volume] maybe 4-5 liters. The water boiled after 12 minutes heating with a propane burner. We randomly placed 3 cowpeas (per treatment) under pins (81 gram) in the Mattson cooker and 5 unsoaked, untreated cream cowpeas were the control. The students learned that not all cowpeas cooked in the same time and that some of the “pins” did not function properly. We put the data in an MS Excel spreadsheet to determine averages and compare means. We tried to have a replicate trial in the afternoon, except that we started with boiling tap water. The data from both trials were summarized (as were the data from Thursday).

30 June Wed – I was able to meet six honors students under the supervision of Dr. Leda Hugo (Leda Hugo phone (o) 09-2581-493-881) before they departed to gather information on their projects. I was also able to review the data in Mr. Brasilino Ubisse honors thesis and discuss with him what it means. He evaluated 5 cowpea varieties and conducted sensory trials. The grey colored cowpea was a traditional variety but the sample burned while preparing for sensory evaluation. The white improved cowpea variety was preferred for appearance, taste and texture over the 3 brown varieties. It is not possible to determine from this data set if the variety or the color of the cowpea was preferred. I was able to talk to Dr. Leda Hugo about the project and problems that she was experiencing. Most of them related to money and the procedures of getting money for people and their work activities.

Dinner guests included Dr. Quilambo, Mr. Pacifico (a financial person), Dr. Hugo, Dr. Pelembe and myself. We discussed some of the issues that this project needed to address. The authorization for advances takes too long. We discussed how this process could be shortened; suggestions included to have several agreements signed (ahead of the time they would be needed) and/or to use a fax or pdf file to finalize the signature. I also suggested to relieve Dr. Pelembe of some of the duties of the financial person who has to know all of the policies for reimbursements; and to have the financial person learn and do the interactions with the Research Foundation. This was discussed further (after Dr. Hugo and I left the dinner table – during the soccer game) since Dr. Quilambo did not understand what I meant. Dr. Pelembe currently conducts the financial communications

with Joanie Birdwell. Mr. Pacifico conducts the financial activities within Eduardo Mondlane University; but does not know English or the rules and policies of the Bean Cowpea CRSP. Dr. Pelembe provided these facts and said that he should continue in this role of financial communicator with Joanie Birdwell.

1 July Thu – I was able to work with Ana and Eduardo in the afternoon. We cooked unsoaked, untreated cowpeas that were cream or speckled. We cleaned the rust from the pins before beginning. We positioned 13 of each cowpea of each color under the pins and cooked them in 9 liters of tap water. It took 25 minutes for the water to boil and 31 minutes before we saw steam come from the top of the pot. The average (50%) cooking time for the cowpeas was 103 and 106 minutes (LSD was around 25-30). The honors students were very surprised that it takes so long to cook cowpeas.

In the evening I was able to speak with Dr. Pelembe about the three issues of money transfers, achievement of project objectives, and his management role (as Host Country PI) to make both aspects of the project in Mozambique to function and be successful. The email address for Dr. Hugo is not functioning consistently. This has to be resolved for each of us to more effectively communicate with Dr. Hugo. I was able to speak to Drs. Hugo and Pelembe for a few minutes about these same issues. I discussed the use and value of digital cameras,

Later in the evening I was able to read some of the literature concerning the water characteristics and the temperature of the water when the legumes are added for the Mattson cooking method. I found that the water most commonly used was deionized and distilled. This water was used to soak and to cook the legumes in the published reports. Most articles added the legumes to boiling water. A couple of articles evaluated several salts on their effects during soaking and during cooking. Sodium chloride soaked and/or cooked beans had higher sensory scores and shorter cooking time compared to most salts. This is significant if we are to make a quick cooking bean or cowpea. How the legumes are soaked may facilitate hydrothermal processing and consumer acceptability. I sent an email message with this information to Dr. Pelembe along with several articles.

2-3 July – I was taken by a hotel van to the airport. I departed on schedule from Maputo to Johannesburg, Johannesburg to Atlanta, Atlanta to Houston and Houston to College Station.