APPENDICIES
APPENDIX 1

GMRP INPUT SUBSECTOR SURVEY COVERAGE
Five separate survey instruments were used:
1. Bureaus of Agriculture
2. Service Cooperatives (SC)/Farmer Associations (FA) and Salaried Retailers/Manager
3. Independent Retailers and Wholesalers
4. Transportation costs for fertilizer distributors other than Scs/FAs and salaried retailers/managers
5. Transporters

Table 1. Coverage of GMRP 1998 Input Subsector Survey – At least one Bureau of Agriculture Survey for each wereda, followed by a survey of a Service Cooperative

<table>
<thead>
<tr>
<th>Region</th>
<th>Zone</th>
<th>Wereda (Number of surveys in parentheses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amhara</td>
<td>West</td>
<td>Bure (3), Wombera (4), Yilmana Densa (4), Dembecha (5)</td>
</tr>
<tr>
<td>Amhara</td>
<td>East</td>
<td>Machakal (5), Gozamin (4)</td>
</tr>
<tr>
<td>Amhara</td>
<td>Awi</td>
<td>Banja (2), Shikudad (4), Dangla (3)</td>
</tr>
<tr>
<td>Amhara</td>
<td>South Welo</td>
<td>Kalu (1)</td>
</tr>
<tr>
<td>Amhara</td>
<td>North Shewa</td>
<td>Gidem (4), Efiratana (4), Ensar and Wayu (1), Moret and Jiru (2), Basona Worena (2), Ensar and Wayu (1), Denaba (1)*</td>
</tr>
<tr>
<td>Oromiya</td>
<td>NW Shewa</td>
<td>Sululta Milo (2), Kimbibit (2), Girar Jarso (3), Wucale (2), Bure-Aleltu (2), Sendef (4), Wonchi (3), Woliso (5)</td>
</tr>
<tr>
<td>Oromiya</td>
<td>East</td>
<td>Ada (5), Shashemene (5), Lume (3), Arsi-Negele (2), Adama (5)</td>
</tr>
<tr>
<td>Oromiya</td>
<td>West Shewa</td>
<td>Ambo (6), Alemgena (4), Dandi (4), Ejere (2), Ilu (2), Becho (3), Chaliya (5)</td>
</tr>
<tr>
<td>Oromiya</td>
<td>Jimma</td>
<td>Manna (3), Seka Cherkorsa (2), Oma Nada (3), Kersa (2), Dedo (1), Asandabo (1)</td>
</tr>
<tr>
<td>Oromiya</td>
<td>Arsi</td>
<td>Tiyo (5), Gadab (3), Kofele (2), Dodola Sire (2), Digelu Tijo (2), Dhera (1), Hitossa (3), Lemu Bilbido (4)</td>
</tr>
<tr>
<td>Oromiya</td>
<td>Bale</td>
<td>Dodola (3), Adaba (3), Sinana Dinsho (3)</td>
</tr>
<tr>
<td>Oromiya</td>
<td>East Welega</td>
<td>Guto Wayu (2), Anno (1), Bulu Sayo (1), Guduru (1), Sire (5)</td>
</tr>
<tr>
<td>Southern (S.N.N.P.R.)</td>
<td>Hadiya</td>
<td>Lemu (7), Badawacho (3)</td>
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<tr>
<td>Southern</td>
<td>Gurarge</td>
<td>Goro (3), Mekana Maroko (3), Checha (1)</td>
</tr>
<tr>
<td>Southern</td>
<td>Sidama</td>
<td>Aleta Wondo (1), Awassa (2)</td>
</tr>
<tr>
<td>Southern</td>
<td>Kembata</td>
<td>Alaba (4), Kachabira (3), Kedida Gemela (2)</td>
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1998 Input Subsector Survey Questionnaire
Bureaus of Agriculture

The objective of this survey is to (1) understand how the organization and performance of the input subsector has evolved in response to recent changes in macro-economic and sectoral policies affecting the agricultural, transport, and fertilizer sectors and (2) to evaluate the potential for cost reductions in the fertilizer sector that could ultimately lower farmgate fertilizer prices, thereby increasing fertilizer demand. Our main role is to understand the situation for designing a questionnaire for the forthcoming study. We would also make recommendations to the government about what types of policies and investments can be made to improve the efficiency of the fertilizer sector and increase fertilizer demand.

I. Respondent ID and characteristics

1. Position of respondent: ______________________________________________
2. How long has respondent been in this position:____________________________

II. Overview of the input market in this area

1. What is the role of the bureaus of agriculture with respect to inputs in this area?
   1. Fertilizer purchases and sales
   2. The distribution and dissemination of improved seeds
   3. The distribution and dissemination of chemicals
   4. The distribution and dissemination of farm implements
   5. The distribution and dissemination of heifers and improved livestock technologies
   6. The distribution and dissemination of soil conservation and forestry technologies
   7. The distribution and dissemination of other technologies (specify)

2. What are the main components/inputs of the extension package in the woreda with respect to:
   Belg crop production
   Meher crop production
   Horticultural crops
   Modern storage
   Livestock husbandry
   Natural resource conservation and forestry
   Introduction of new crops
   Introduction of irrigation schemes
   Others (specify)

3. What are the procedures for getting inputs to farmers participating in the government extension program?
   1. How are farmers selected?
   2. How and when are quantities of inputs for the program determined?
3. Who collects the down payments_____________________ and the final payments__________________?
4. Who keeps the records of inputs received____________________ and payments made________________?
5. Who (what distributor) supplies the inputs?
   fertilizer_________________; seed_________________; pesticides and herbicides_________________; other_________________
6. How are the distributors selected? If it is a bidding process, who organizes the bids and how many bidders were there this year?
7. How many distribution points for extension packages are there in the wereda?
8. Were all the inputs for the packages delivered to the wereda on time this year? If not, what were the problems?

4. Did the SG program provide farmers in your woreda with inputs in the past? (yes/no)
   __________

If yes, how did that distribution system differ from the one for the government extension program described above?

5. How much fertilizer (in quintals) was sold in this woreda?  **Note quantities in NEP and Regular Credit program if possible**

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<tr>
<th></th>
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<tbody>
<tr>
<td>DAP</td>
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<td></td>
</tr>
<tr>
<td>urea</td>
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</table>

6. How is it determined how much fertilizer should be supplied to your area?

7. What are the main problems with respect to fertilizer distribution? (For example, timing, quantities, credit, etc.)
   1. 
   2. 
   3. 

III. Details of participants in the fertilizer market in this area

1. How many of the following operate in this woreda? importer/distributors
   __________
   independent retailers/wholesalers__________

2. How many sales centers (places at which farmers collect their fertilizer purchase or shiyach tabia) are there in the woreda? ____

3. How many SCs are there in the woreda? __________

4. Where are the independent retailers/wholesalers located? (Get enough info so that you can locate them for the survey)
5. Have you seen fertilizer trade increase or decrease in this area in the last 5 years?
6. If there has been a change, what is this change attributed to?
7. Is the SG-2000 program functioning in your area this year? (yes/no) __________
8. What are the principal activities of the SG-2000?
9. What is the range of distance farmers travel to pick up fertilizer from:

<table>
<thead>
<tr>
<th>Min. kms.</th>
<th>Max. kms.</th>
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<tbody>
<tr>
<td>the SCs:</td>
<td></td>
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<tr>
<td>the importer/wholesaler sales outlet:</td>
<td></td>
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<tr>
<td>the government extension program:</td>
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10. What is the different modes of transport used by farmers to transport fertilizer from the above locations

   ____ pick-up (1=common, 2=sometimes, 3=never)
   ____ car (1=common, 2=sometimes, 3=never)
   ____ ox-cart (1=common, 2=sometimes, 3=never)
   ____ pack animal (1=common, 2=sometimes, 3=never)
   ____ bicycle (1=common, 2=sometimes, 3=never)
   ____ on foot/human load (1=common, 2=sometimes, 3=never)
   ____ other (specify) ______________________ (1=common, 2=sometimes, 3=never)
11. We understand that fertilizer traders are required to have a license. Is the agricultural bureau involved in:

   issuing licenses (yes/no) __________
   verifying licenses (yes/no) __________
12. If the agricultural bureau is involved in issuing licenses, what is the procedure?
13. If the agricultural bureau is involved in verifying licenses, what is the procedure?
14. If this agricultural bureau does not participate in these activities, where do these activities occur (at killil level?):

   issuing licenses _________________
   verifying licenses _______________

IV. Credit

1. What is the role of the bureau of agriculture with respect to fertilizer credit?
2. Describe the process of obtaining credit in this area (what does farmer do, SC, ag bureau, zone bureau, finance bureau, others?).
3. If the allocated amount of credit is less than the quantity demanded, then what adjustments do you make in allocating fertilizer?
4. How many bank branches are located in this woreda?
5. What was the average level (or percent) of down payment for fertilizer purchases in each
of the following years?

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<tr>
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<tbody>
<tr>
<td>Extension</td>
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<tr>
<td>Regular</td>
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</table>

6. During the last 4 years, has fertilizer credit received by the woreda ever been less than what was necessary to cover fertilizer demanded by farmers?
7. If yes to 6., how did you deal with the situation?
8. What is the extent of cash sales for fertilizer in the woreda (estimate the % in the total sales)?
The definition of a salaried retailer/manager is one who works at the stores for an importer/wholesaler for a fixed salary. We would like to talk to a Member of the SC committee.

“Thank-you for agreeing to participate in this survey. I need to begin by getting some general information about you and your firm.”

I. **Respondent ID and characteristics**

1. Name of organization: ______________________________________________

2. **FOR SC/FA:** Respondent’s position (circle one)  
   1. manager  
   2. sales clerk

3. For how long has the respondent been in this position? _____months and _____years

4. Education of respondent:  
   Formal schooling in number of years:  
   primary____ secondary_____ technical______ university _______

   Other types of training: type______________________ years____________

   Did the respondent receive special training related to fertilizer use or sales? (yes/no) ______ If yes, explain. (magnitude)

5. What are the months in which you work in fertilizer activities? (Circle the number(s) below corresponding to the month in the Ethiopian calendar)

   Months 1 2 3 4 5 6 7 8 9 10 11 12 13 [circle]

6. Is this the same time as in previous years? (yes/no) ________ If not, explain changes.

7. **FOR SCs/FA:** What other services do you offer to your members?
II. “Now I would like to get a picture of the fertilizer retail trade in your area of operation.”

1. **FOR RETAILER:** Has the competition you face from other retailers or distributors increased, decreased, or remained the same since you became involved in fertilizer?
2. If there has been a change, to what do you attribute it?
3. From how many kilometers away do your clients/members come to get fertilizer? (Give the range in kilometers from those that travel the farthest to those that are closest)
4. **FOR SCs/FAs:** Do farmers in your area participate the NEP program? (yes/no) _______
5. Is it any more difficult to get NEP inputs than regular inputs? Have there been any problems?
6. Who are the input distributor(s) for the NEP program in your wereda?
7. Do all retailers in this wereda sell to farmers at the same price? (yes/no) _______
   If not, explain the differences.

III. Quantitative questions about overall fertilizer activities

8. How much have you stocked this season, 1990? (1998?)
   DAP _____ quintals
   urea _____ quintals
9. What were your carryover stocks from 1989? (1997?) (last season?)
   DAP _____ quintals
   urea _____ quintals
10. How much have you sold so far in this season, 1990? (1998?)
    DAP _____ quintals
    urea _____ quintals
11. What are your anticipated carryover stocks this season, 1990? (1998?)
    DAP _____ quintals
    urea _____ quintals
5. What is the sale price for:
   For credit sales (DO NOT INCLUDE INTEREST)
      DAP minimum price _____, maximum price _____,
      always _____ birr/qt
      urea minimum price _____, maximum price _____,
      always _____ birr/qt

   For cash sales
      DAP minimum price _____, maximum price _____,
      always _____ birr/qt
      urea minimum price _____, maximum price _____,
      always _____ birr/qt

6. **For SCs/FAs:** What is your margin per quintal of fertilizer? _______birr
7. **FOR SCs/FAs:** How many fertilizer-using members are there in your SC/FA? _______
8. **FOR SCs/FAs:** What was the timing of the following activities for this year?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Month begin</th>
<th>Month end</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report fertilizer needs to agricultural bureau</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collect down payment for credit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arrival of fertilizer at SC/FA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales to farmers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. What are the terms of the credit provided to farmers?

   - Is there a down payment? (yes/no) ___________
     - If yes, the most 1. lowest % ___________
     - 2. highest % ___________
     - 3. common % ___________

   - Annual interest rate? ___________
   - Duration of loan? ___________
   - Other details ___________

10. **FOR SCs/FAs:** What is the repayment recovery rate of your members for last year?

    How many paid __________, How many did not pay __________

11. **FOR SCs/FAs:** What determines whether you can receive credit next season? (what percent of loan is required for payback? 100%?)

12. **FOR SCs/FAs:** What do you do to enforce repayment?

“Now I would like to understand the process that you must follow to obtain your fertilizer supply, market it, and management of stocks.”

### IV. Fertilizer Procurement

1. **FOR SCs/FAs:** Who was your supplier for DAP? ________________ for urea? ________________

2. **FOR SCs/FAs:** Are the (1) fertilizer supplies delivered to you or (2) do you have to collect the fertilizer supplies on behalf of the farmers? (circle one)

3. **FOR SCs/FAs:** If you do have to collect fertilizer supplies, how many km did you have to go for DAP __________, for urea __________

4. **FOR SCs/FAs:** Did you hire transport? (yes/no) __________

5. **FOR SCs/FAs:** If you did **not** hire transport, how do you collect the fertilizer?

6. **FOR SCs/FAs:** If transport was **hired** by you to collect fertilizer, could you give us the details of different examples of collection:
7. What were the biggest problems you encountered in getting your fertilizer supplies this year?
   1.
   2.
   3.
   4.

8. Is there anything that you can do differently next year to avoid these problems?
   1.
   2.
   3.
   4.

9. Is there anything that other actors in the fertilizer sector (importers, retailers, government, extension agents) can do to reduce these problems?
   1.
   2.
   3.
   4.

V. “We would now like to ask a few questions about your sales.”

1. FOR SALARIED RETAILER ONLY: Has your company done anything to encourage farmers to use more fertilizer? (circle one for each)
   Advertising
   1 - sometimes, 2 - often, 3 - never
   Repacking fertilizer into smaller bags than the standard
   1 - sometimes, 2 - often, 3 - never
   Using roving agents
   1 - sometimes, 2 - often, 3 - never
   Demo fields
   1 - sometimes, 2 - often, 3 - never
   Price reductions
   1 - sometimes, 2 - often, 3 - never
   Credit flexibility
   1 - sometimes, 2 - often, 3 - never
   Offering advice on how to use products
1 - sometimes, 2 - often, 3 - never
Deliver fertilizer to farms
1 - sometimes, 2 - often, 3 - never
Offer prearranged farmer specific contracts to deliver a specified amount on a
certain date
1 - sometimes, 2 - often, 3 - never
Promote cash sales
1 - sometimes, 2 - often, 3 - never

2. Was there ever a period when farmers wanted fertilizer and you had none in stock? (yes/no) ____________

3. If yes to 2., what was the source of the problem?

4. Has the volume of sales expanded, contracted or remained the same over the last 5 years? ________________

5. If there has been a change in the volume of sales, to what do you attribute it?

6. How much have you sold this year in:
   - cash ___________ quintals (both DAP and urea)
   - credit ___________ quintals (both DAP and urea)
   - in-kind ___________ quintals (both DAP and urea)

7. What were major problems that you encounter in your fertilizer sales this year?
   Problems to mention for prompts: Unexpected costs, delays in delivery to clients, complaints about
   fertilizer quality, dissatisfied clients, delays in payments by clients, other.
   1. 
   2. 
   3. 
   4. 

8. Is there anything that you can do differently next year to avoid these problems?
   1. 
   2. 
   3. 
   4. 

9. Is there anything that other actors in the fertilizer sector (importers, retailers, government,
   extension agents) can do to reduce these problems?
   1. 
   2. 
   3. 
   4. 

10. What has been your experience with cash sales? Do they pose different problems than
credit sales? If yes, explain.
Definitions: *Independent* operators are ones who purchase their own supplies of fertilizer and resell them.

*Wholesalers* have annual turnover of 150 to 3000 tons; they get supplies from distributors and do not go to the port themselves.  
*Retailers* have annual turnover from 10 to 150 tons; they get supplies from distributors (?) or wholesalers.

This questionnaire is designed for the owner of the retail or wholesale operation. If you encounter a manager or a sales agent, administer the questionnaire for salaried retailers instead of this questionnaire.

**III. Respondent ID and characteristics**

1. Respondent’s name:___________________________Name and type (ret/whole) of firm: ______________________________
2. Respondent’s position in the firm 
   A. owner
   B. manager
   C. other ________________
3. What type of operation is involved: (circle applicable response)
   1. Purchases supplies from multiple distributors
   12. Purchases supplies from only one distributor
4. How many sales outlets do you have?
   I. In this wereda?
   2. In other wereda? (specific names of other wereda).
5. Education of owner:
   Formal schooling in number of years: primary____ secondary____
   technical_______university _______
   Other types of training: type__________ years____________
6. We would like a few details about how you got started in your fertilizer business.  
   a. What year did you begin trading fertilizer? ________
   b. When did you leave the fertilizer business? ________
   c. First location of operation:______________________
   d. How did you get the idea to become a fertilizer dealer?_________________________
   e. Time elapsed between the first active step to starting up business and first sales
   f. Paperwork involved? Specify amount of time in days/weeks/months required for each activity?
      (1) Obtaining License
      (2) Obtaining Other Necessary Permits
      (3) Obtaining Financial capital
      (4) Training _________ __________________
      (5) Other (specify)
7. If someone wanted to start a retail fertilizer business in this area now would it be easier, more difficult, or about the same level of difficulty as when you started in your business?

8. What are the months in which you work in your fertilizer business? (Circle the number(s) below corresponding to the month in the Ethiopian calendar)

   Months  1  2  3  4  5  6  7  8  9  10  11  12  13 [circle]

9. What other business do you operate? (yes or no)
   1. grain trade ______  4. transport service ______
   2. merchandise trade ______  5. farming (livestock) ______
   3. flour mill ______  6. others _______________

11. Which of the businesses in question 9. function at the same time as your fertilizer business (list numbers from question 9)?

12. Why did you leave the fertilizer business? Please explain in detail. (Ali, Did he lose money or is it not as profitable as other activities?)

13. Would you ever re-enter the fertilizer business? (yes/no) _____________

14. Under what conditions would you re-enter the fertilizer business?

“Now I would like to get a picture of the fertilizer trade in your area of operation.”

15. From how many km away do your clients come? (Give the range in kilometers from those that travel the farthest to those that are closest)

16. How many other dealers sell directly to farmers or farmers associations in this wereda?
   1. Independent retailers or wholesalers (Purchase own stocks)
   2. Wholesalers/distributors outlets (Salaried staff sells stocks owned by one of major importer/distributors)
   3. Others (specify)

17. Has the competition you face from other dealers increased, decreased, or remained the same since you began your business?

18. If there has been a change, to what do you attribute it?

19. Do you sell at the same prices as other dealers in the wereda? If not, explain the differences and any problems these differences create for you.

Quantitative questions about overall fertilizer retail business

20. How much have you purchased this season, 1990? (1998?)

   DAP  ______
   urea  ______

21. What were your carry over stocks from 1989? last season?

   DAP  ______
   urea  ______

19. How much have you sold so far in this season, 1990? (1998)?

   DAP  ______
   urea  ______

20. What are your anticipated carryover stocks in this season, 1990? (1998?)

   DAP  ______
   urea  ______
21. What are the minimum and maximum prices you paid for fertilizer purchases since last season, September 1989 in which you took delivery at the distributors?
   DAP  minimum price _____  maximum price _____
        always at ______ birr   no such cases______
   urea  minimum price _____  maximum price _____
        always at ______ birr   no such cases______

21. What are the minimum and maximum prices you paid for fertilizer purchases since last season, September 1989 in which fertilizer was delivered to you?
   DAP  minimum price _____  maximum price _____
        always at ______ birr   no such cases______
   urea  minimum price _____  maximum price _____
        always at ______ birr   no such cases______

23. What are the minimum and maximum prices you charged for fertilizer sales which farmers picked up at your store this year?
   DAP  minimum price _____  maximum price _____
        always at ______ birr   no such cases______
   urea  minimum price _____  maximum price _____
        always at ______ birr   no such cases______

24. What are the minimum and maximum prices you charged for fertilizer sales which you delivered to farmers at their village this year?
   DAP  minimum price _____  maximum price _____
        always at ______ birr   no such cases______
   urea  minimum price _____  maximum price _____
        always at ______ birr   no such cases______

25. Has the geographic coverage of your fertilizer business expanded, contracted or remained the same since you began operations? _____________

26. If there has been a change, to what do you attribute it?

27. What is the minimum margin between purchase price and sales price that you could accept and still make a reasonable profit. _______________

28. If your volume of sales doubled, could you accept a smaller margin?

“Now I would like to understand the process that you must follow to obtain your fertilizer supply, market it, and take care of any unsold stocks. I’m particularly interested in the timing of the key activities, the costs associated with each, and how the process has changed during the last 5 years.”

Fertilizer procurement

29. What determines when you purchase your fertilizer and how many times you purchase during the year
30. How do you determine from whom you will purchase the fertilizer?

31. How is your purchase price determined? (Circle the one that is most common)
   A. Set by supplier
   B. Negotiated between yourself and supplier privately
   C. Other, explain

32. Could you get a quantity discount if the size of your purchases were larger? If so, explain relationship between quantities and prices.

33. If quantity discounts are possible, what prevents you from increasing the size of your purchases?

34. Does the month of the year in which you purchase fertilizer make a difference in the price you pay? If so, explain how prices vary by month of purchase.

35. What type of financing arrangements do you use to purchase your fertilizer stocks?
   A. Personal resources ________ specify source of cash __________
   B. Bank credit __________
      specify bank __________
      specify interest rate (e.g., 12%/yr or 2%/mo., etc.) __________
      specify period of loan (total months) __________
      specify total credit of this type received __________
   C. Supplier credit ________
      specify interest rate (e.g., 12%/yr or 2%/mo., etc.) __________
      specify period of loan (total months) __________
      specify total credit of this type received __________
   D. Other ________ details ________________

36. What were the biggest problems you encountered in getting your fertilizer supplies this year?
   A. 
   B. 
   C. 
   D. 

37. Is there anything that you can do differently next year to avoid these problems?
   A. 
   B. 
   C. 

38. Is there anything that other actors in the fertilizer sector (importers, distributors, government) can do to reduce these problems?
   A. 
   B. 
   C. 
   D. 

39. Is there anything you could have done to reduce your purchase costs this year? (Larger order, cash payment, earlier repayment of credit, etc.)
40. What prevented you from doing these things?

We would now like to ask a few questions about your sales

41. Who are your principal clients (rank by volume of sales per group)
   A. Individual farmers purchasing for belg production
   B. Individual farmers purchasing for meher production
   C. Farmers associations or service cooperatives
   D. Other (specify)

42. Have you done anything special to encourage farmers to use more fertilizer? (circle one for each)
   A. Advertising
      1 - sometimes, 2 - often, 3 - never
   B. Repacking fertilizer into smaller bags than the standard
      1 - sometimes, 2 - often, 3 - never
   C. Using roving agents who go to villages
      1 - sometimes, 2 - often, 3 - never
   D. Demonstration fields
      1 - sometimes, 2 - often, 3 - never
   E. Price reductions
      1 - sometimes, 2 - often, 3 - never
   F. Credit flexibility
      1 - sometimes, 2 - often, 3 - never
   G. Offering advice on how to use products
      1 - sometimes, 2 - often, 3 - never
   H. Other (specify)
      1 - sometimes, 2 - often, 3 - never

43. Has the volume of sales for your retail fertilizer business expanded, contracted or remained the same since you began your business?

44. If there has been a change, to what do you attribute it?

45. How is the sale price determined: (circle all that apply)
   A. Set by yourself based on what other dealers are charging
   B. Negotiated individually with each sale
   C. Other (specify)

46. How much have you sold this year in (specify unit: quintals or tons):
   A. cash _________________
   B. credit ________________
   C. in-kind payment at time of harvest _____________
   D. other (specify)______________________________

47. Was there ever a period when clients wanted fertilizer and you had none in stock?

48. If yes, when did this occur and what was the source of the problem?
49. What were major problems that you encounter in your sales operation this year? (Don’t repeat problems already mentioned thus far.)
   A.
   B.
   C.
   D.

INTERVIEWER NOTE: For each type of problem encountered provide detailed explanation of what happened and the impact on the business:
Possible problems: Unexpected costs, delays in delivery to clients, complaints about fertilizer quality, dissatisfied clients, delays in payments by clients, other
Possible impacts: Lower profits, reputation negatively affected, other.

54. What could you have done to avoid these problems next year?

55. What could other actors in fertilizer subsector do to diminish these problems?

Operating costs

Now we are going to ask some more specific questions about general operating costs and your ideas about how these could be reduced.

If you incur any of the following types of costs in running your fertilizer business please help us understand the magnitude of these costs:

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Describe exact nature of cost</th>
<th>Estimated cost in birr (fill in at least one of two columns below):</th>
<th>Estimated time spent by you for this activity (days/yr)</th>
<th>Were this year’s costs less, same, or more than last year’s costs?</th>
<th>Could these costs be reduced if the volume of your purchases/sales was greater? If yes, explain</th>
<th>Is there anything you can do to reduce these costs in the future? If yes, explain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage space</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 If storage space is rented, report total annual expenditure on rent during months in which fertilizer is stored. If storage space is owned, ask respondent for an estimate of how much income he could make by renting the storage space to others or how much it would cost him to rent a similar amount of space from others during the months that he stores fertilizer.
<table>
<thead>
<tr>
<th>Building maintenance</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone, fax, etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost Category</td>
<td>Describe exact nature of cost</td>
<td>Estimated cost in birr (fill in at least one of two columns below):</td>
<td>Estimated time spent by you for this activity (days/yr)</td>
<td>Were this year’s costs less, same, or more than last year’s costs?</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>Salaries and wages</td>
<td>Full time employees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Part time employees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rebagging</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other (specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual loss</td>
<td>during transport</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>during storage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>See separate transport pages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** Go to transport cost questionnaires for (1) hired or (2) owned/operated vehicles.
This questionnaire is for all fertilizer market participants that are hiring transport for fertilizer purchases and/or sales.

Many reports we have read about fertilizer prices in Africa claim that one of the reasons for very high prices in Africa is that transportation costs are very high. For this reason, we would like to better understand all the elements that go into the transport costs that you pay for transporting fertilizer.

55. For all cases where you have paid for fertilizer transport please report the following details:

<table>
<thead>
<tr>
<th>origin</th>
<th>destination</th>
<th>kms</th>
<th>Road condition</th>
<th>total quantity (quintals)</th>
<th>transport cost (birr/quintal/km)</th>
<th>loading costs</th>
<th>off-loading costs</th>
<th>month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1. poor condition/dirt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. good condition/dirt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. poor condition/gravel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. good condition/gravel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. poor condition/paved</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6. good condition/paved</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7. other (specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

56. Would the transport costs listed above have been lower if: (yes/no)
   the fertilizer shipments were larger ___________
   the timing of the shipment was different ___________
   the roads were better ___________
   other (specify) ____________________

“We would now like to ask some details about what vehicles you own and costs of vehicle operation.”

5. How many different types of transport do you own?

<table>
<thead>
<tr>
<th>Type of transport</th>
<th>Capacity (kg, quintals or tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>pick-up</td>
<td></td>
</tr>
<tr>
<td>small truck</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>---</td>
</tr>
<tr>
<td>big truck</td>
<td></td>
</tr>
<tr>
<td>other</td>
<td></td>
</tr>
</tbody>
</table>
This questionnaire is for all fertilizer market participants (importers, wholesalers, private retailers, etc.) and transporters who OWN their own vehicles.

II. “Thank-you for agreeing to participate in this survey. I need to begin by getting some general information about you and your firm.”

QUESTIONS FOR TRANSPORT COMPANIES ONLY, ALL OTHERS GO TO PAGE 2.

1. Name of firm: __________________________
2. Respondent’s position in firm: __________________________
3. How long in that position: __________________________
4. How long with firm: __________________________
5. Prior work experience before joining the firm: __________________________
6. How long has firm been transporting fertilizer in Ethiopia: __________________________
7. What was required of your firm to enter the transport business (amount of financial capital, contacts)? __________________________
8. Is the firm involved in transportation of other products? If so, what products: __________________________
9. Would you like to expand your fertilizer business? (transport more fertilizer?) __________________________
10. Could you take on more fertilizer transport contracts during the peak fertilizer period? __________________________
11. What are your busiest months during the year for transport of any commodities? __________________________(Ethiopian calendar months)

QUESTIONS FOR ALL TRANSPORT OWNERS:

12. Do you consider your overall transport business (circle one)
   1. unprofitable
   2. slightly profitable
   3. very profitable

13. Has the profitability of your business increased, decreased, or remained the same since the beginning of your operations?

14. If there has been a change, to what do you attributed it?
15. Is transporting fertilizer (1) more (2) less (3) about the same level of profitability as transporting other products such as grains?
16. If fertilizer transport is more or less profitable than grain transport, explain why?
17. What could you do to increase the profitability of your transport activities?

II. “We would now like to get some cost details of transporting fertilizer on your most recent fertilizer shipment in which you transported fertilizer.”

1. Route:
   origin: __________________________
   destination: __________________________
2. Kilometers traveled ______________
3. Quantity of shipment ______________ quintals
4. Month of travel ______________
5. Total cost of transport on this route ______________
6. Other charges associated with this shipment?
   loading? ___________ birr/quintal
   off-loading? ___________ birr/quintal
   other? _______________________ (specify units)
7. Truck capacity ___________ tonnes
8. What percent of the truck was filled with fertilizer? ___________ percent
9. Were other goods also transported at the same time as fertilizer? (yes/no) ___________
   What products? ____________________________
10. Did you carry a return load? (yes/no) ____________________ If yes, what product(s)?
   _________________________________________
11. If the amount of the fertilizer shipment was to double in size, would you offer a lower transport cost per quintal per kilometer? (yes/no) ___________
12. If yes to 11., what would that lower rate be? ________________(If they don’t know the unit rate, ask for the total cost.)
13. Condition of road (circle the one that best applies)
   1. good condition dirt
   2. poor condition dirt
   3. good condition gravel
   4. poor condition gravel
   5. good condition paved
   6. poor condition paved
   7. other (specify) ____

We would now like to ask details of the cost you face in your transport business. [The information required of transporters is to determine the largest component of their costs. To accomplish this, we can follow the list of costs below as a rough outline of a typical cost build-up for transporters.]
IV. Transport cost build-up

1. Variable costs

“Please specify the following costs for two types of different size trucks (pick-up, truck, trailer) you may have”

<table>
<thead>
<tr>
<th>Item</th>
<th>Vehicle type _________ tons _______</th>
<th>Vehicle type _________ tons _______</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Costs [specify unit]</td>
<td>Comparison to last years costs [less, same, more]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Costs [specify unit]</td>
</tr>
<tr>
<td>vehicle cost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>age at purchase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>estimated years of service after purchase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>duty paid/taxes at purchase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>salvage value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>financed (% of delivered cost)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>interest rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>loan period (year)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>depreciation/year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>utilization km/year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of vehicle capacity used/km</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Vehicle type _________ tons _______</th>
<th>Vehicle type _________ tons _______</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Costs [specify unit]</td>
<td>Comparison to last years costs [less, same, more]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Costs [specify unit]</td>
</tr>
<tr>
<td>insurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>replacement tire cost (all tires)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>average tire life (km)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Quantity</td>
<td>Cost (specify unit)</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------</td>
<td>---------------------</td>
</tr>
<tr>
<td>vehicle registration/license/taxes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>office space/garage (rent)</td>
<td>no. of offices ___</td>
<td></td>
</tr>
<tr>
<td></td>
<td>no. of garages ___</td>
<td></td>
</tr>
<tr>
<td>utilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>labor</td>
<td>no. of full-time ___/year</td>
<td></td>
</tr>
<tr>
<td></td>
<td>no. of part-time ___/week or per month</td>
<td></td>
</tr>
</tbody>
</table>

APPENDIX 2

FINANCIAL IMPORT PARITY PRICE CALCULATION NOTES
This appendix serves to provide more detail of the notes explaining the financial import parity price calculations for DAP and urea on page 180.

In 1998 shipments that were originally scheduled to arrive in Assab were rerouted when the Ethiopian-Eritrea conflict began in May 1998. All port transactions in Assab were paid in US dollars and calculated based upon a fixed exchange rate of US$ 7.20/Birr due to an agreement between the two governments at succession. In Djibouti the exchange rate used was the prevailing market rate in Addis. Bank charges were a fixed fee equal to 1.25 percent of the c.i.f. value for the service of transferring money from an Ethiopian bank to a foreign bank. Insurance is purchased either from an Ethiopian insurance company or a foreign insurer. Rates vary by insurers and also vary inversely with the total quantity insured.

Interest charged on the loan of the Ethiopian importer was added to the cost build-up. It was roughly 3 months between the time the loan was approved and the fertilizer arrived, thus there was an interest charge of 10.5 percent per annum on 100 percent of the c.i.f. value for 3 months. Additional interest payments occurred while the fertilizer is stored in Nazreth for 2 months before it was shipped to retail markets.

Once the ship was at the quay, a transit company managed the clearing operations of transferring the cargo from ship to truck and sending it on its way to Ethiopia. The transit company received the bulk of the payment, the port authority only received the port charges. In both Assab and Djibouti the port charge was US$ 1/MT. A transit charge was paid to a transit company (independent of the port authority) for handling cargo ex-quay until the cargo is loaded into a truck (typically a day later). A “transitor” traces discharged cargo, performs payment for loading cargo into a truck (by hiring port equipment like cranes, fork lifts and labor). Transit charges vary depending on how much fertilizer is stored at the port. In the past, some importers stored up to 40 percent of their shipment, but in 1998 typically 25 percent of a 25,000 MT shipment was left in storage due to the unavailability of transport. The transit charge was US$ 1.50/MT charged on the entire shipment and an additional US$ 7.20/MT charged on the portion left in storage at the port. In Djibouti a grace period of 45 days was permitted for stored fertilizer and in Assab, the limit was 30 days. Typically, fertilizer was removed from port storage within these periods.

Stevedoring refers to any charge related to unloading cargo from a ship to dock and is primarily a payment for labor services rendered. A minimum of 18 laborers are required around each of the 4 ship hatches for unloading. An additional 18 laborers are required for bagging and loading into trucks.

Crane charges are charged for use of cranes to off-load fertilizer. In Assab, a crane charge is charged regardless of whether ship or shore cranes are used. Crane charges were variable and exclusively charged (Kassahun 1998). In Djibouti ship cranes were usually used to transfer fertilizer directly from the ship into the funnel of the bagging machine that sits on the ground. Bagging was conducted immediately after fertilizer is off-loaded.

Typically three bagging machines were used on a shipment of 25,000 MT. A bagging machine usually runs 16 hours/day, a total of 18.75 bagging-days for a shipment of 25,000 MT. The rent for one machine was US$ 48/day, a total of US$ 900 for 25,000 MT (US$ 27.77/MT). Some companies such as EAL have their own bagging machines. A fee of US$ 4.25/MT was charged for use of own machines. Often before fertilizer is bagged, rent of excavators was required to mix up caked DAP (but not urea) on the ship.

In Assab, many of the port fees were fixed for stevedoring, bagging, etc., but in Djibouti many of the rates were more flexible and negotiated privately between two parties. Other costs in the cost build-up were also less transparent and may be a reflection of the relative efficiency of one company over another. For example, losses, administration and overhead, and margins must be estimated at an average although they will vary between suppliers. An estimated 0.5 percent
of the c.i.f. price is calculated as losses for one company (Kassahun 1998). Administration and overhead also will vary considerably from importer to importer (US$ 0.15/MT is calculated for one relatively efficient company). A procurement margin of 2 Birr/quintal was added into the cost-build up. Fertilizer imports felt this margin was acceptable, a margin of 3-5 Birr/quintal was considered quite high in 1998 (GMRP 1998). The fertilizer subsector in Ethiopia is highly vertically integrated thus importers are also often engaged in wholesale and retail sales. A wholesale/retail margin of 2 Birr/quintal is added in addition to the 2 Birr/quintal importer margin.

Once fertilizer is bagged and loaded onto truck-trailers it is transported to the central storage warehouses in Nazreth. Only truck-trailers are used on the Assab or Djibouti routes, the capacity of which is between 22-40 tons, although 90 percent of the time, the capacity of the truck-trailers is 30 tons. There are no economies of scale present in inland transport, transport rates do not vary according to whether the truck-trailer is filled to capacity. The Djibouti-Nazreth in-land transport rate (0.057 Birr/MT/km) was higher than the Assab-Nazreth rate (0.044 Birr/MT/km) because Djibouti was a less efficient than the port of Assab. The turnaround time in Djibouti was longer for truck-trailers due to inefficient labor in coordinating and loading trucks (Kassahun 1998).
APPENDIX 3
PROFITABILITY SIMULATIONS FROM CHANGES IN FERTILIZER COST
<table>
<thead>
<tr>
<th>Budget Item</th>
<th>Tech 1 Local seed, no fert.</th>
<th>Technology 2 Local seed plus DAP</th>
<th>Technology 3 Improved seed, DAP, and urea &lt; recomm.</th>
<th>Technology 4 Improved seed, DAP and urea &gt;= recomm.</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1.0 n</td>
<td>4</td>
<td>21</td>
<td>22</td>
<td>28</td>
</tr>
<tr>
<td>Maize yield (kg/ha)</td>
<td>1835.00</td>
<td>2886.88</td>
<td>2921.77</td>
<td>4619.05</td>
</tr>
<tr>
<td>Adjusted maize yield (kg/ha)</td>
<td>1763.00</td>
<td>2829.72</td>
<td>2863.92</td>
<td>4527.59</td>
</tr>
<tr>
<td>Farmgate price of maize (Birr/ha)</td>
<td>0.54</td>
<td>0.54</td>
<td>0.54</td>
<td>0.54</td>
</tr>
<tr>
<td>Return</td>
<td>952.02</td>
<td>1528.05</td>
<td>1546.52</td>
<td>2444.90</td>
</tr>
<tr>
<td>Total Variable Costs</td>
<td>705.90</td>
<td>682.85</td>
<td>1064.84</td>
<td>1235.16</td>
</tr>
<tr>
<td>Seed (Birr/ha)</td>
<td>49.00</td>
<td>33.14</td>
<td>44</td>
<td>107.6</td>
</tr>
<tr>
<td>DAP (Birr/ha)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Urea kg/ha</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Herbicide (Birr/ha)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Pesticide (Birr/ha)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Fungicide (Birr/ha)</td>
<td>0.00</td>
<td>0.00</td>
<td>1.70</td>
<td>0.00</td>
</tr>
<tr>
<td>Interest (Birr/ha)</td>
<td>387.00</td>
<td>240.50</td>
<td>532.58</td>
<td>448.11</td>
</tr>
<tr>
<td>Labor (Birr/ha)</td>
<td>351.00</td>
<td>217.22</td>
<td>484.43</td>
<td>396.18</td>
</tr>
<tr>
<td>Family &amp; mutual labor (Birr/ha)</td>
<td>78.00</td>
<td>48.27</td>
<td>107.65</td>
<td>88.04</td>
</tr>
<tr>
<td>Family &amp; mutual labor days</td>
<td>36.00</td>
<td>23.28</td>
<td>48.15</td>
<td>51.93</td>
</tr>
<tr>
<td>Animal traction (Birr/ha)</td>
<td>261.00</td>
<td>103.13</td>
<td>92.38</td>
<td>100.3</td>
</tr>
<tr>
<td>Hand tools and sacks (Birr/ha)</td>
<td>8.90</td>
<td>89.64</td>
<td>90.45</td>
<td>141.49</td>
</tr>
<tr>
<td>Tools (Birr/ha)</td>
<td>3.10</td>
<td>3.03</td>
<td>2.80</td>
<td>2.92</td>
</tr>
<tr>
<td>Sacks (Birr/ha)</td>
<td>5.80</td>
<td>86.61</td>
<td>87.65</td>
<td>138.57</td>
</tr>
<tr>
<td>Net Margin/Hectare (3.-4.)</td>
<td>246.12</td>
<td>845.20</td>
<td>481.67</td>
<td>1209.74</td>
</tr>
<tr>
<td>Gross Margin/Hectare/Labor Day</td>
<td>7.66</td>
<td>22.01</td>
<td>8.97</td>
<td>18.24</td>
</tr>
</tbody>
</table>

Notes for Tables 1-4:

1. Technology types were split into two: the 50% of farmers with the lowest yields and highest yields.
2. Assumes no grain lost during shelling. Adjusted yield assumes maize harvested in November and storage losses of 1.98% per month until crop sale in January.
3. Grain sold in January, immediately following harvest.
4. MOA/SG2000 maize package consists of 25 kg/ha seed, 100 kg/ha DAP, 100 kg/ha urea.
5. SG participants pay no interest; MOA program participants pay 10% interest annually for 10 mo.
6. Valued at cash/in-kind payment rates provided by survey participants.
7. Mutual labor = extended family members. Family/mutual labor valued at an ave. 4.5 Birr/day.
8. Sum of rental costs reported by survey respondents; and for owned/borrowed oxen, maintenance plus depreciated value of animals and animal traction. Equipment multiplied by % of total farm represented by the MOA-SG, traditional or graduate plot.
9. Depreciated value of 2 hoes, 2 axes, 2 cutting knives.
10. Depreciated value of sacks needed to transport maize marketed in January. Since sacks are retained by farmers and used for other purposes, cost is apportioned by multiplying depreciated sack value by percentage of total farm represented by MOA-SG or graduate plot.
### Table 2. Budgets by Labor Use – Scenario 6, reduced transport, 100% direct,, delivery 10% reduction in low-priced international f.o.b. price

<table>
<thead>
<tr>
<th>Budget Item</th>
<th>Tech 1</th>
<th>Technology 2</th>
<th>Technology 3</th>
<th>Technology 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>4</td>
<td>21</td>
<td>22</td>
<td>28</td>
</tr>
<tr>
<td>1. Maize yield (kg/ha)</td>
<td>1835.00</td>
<td>2886.88</td>
<td>2921.77</td>
<td>4619.05</td>
</tr>
<tr>
<td>1.a. Adjusted maize yield (kg/ha)</td>
<td>1763.00</td>
<td>2829.72</td>
<td>2863.92</td>
<td>4527.59</td>
</tr>
<tr>
<td>2. Farmgate price of maize (Birr/ha)</td>
<td>0.54</td>
<td>0.54</td>
<td>0.54</td>
<td>0.54</td>
</tr>
<tr>
<td>3. Return</td>
<td>952.02</td>
<td>1528.05</td>
<td>1546.52</td>
<td>2444.90</td>
</tr>
<tr>
<td>4. Total Variable Costs</td>
<td>705.90</td>
<td>657.58</td>
<td>1024.27</td>
<td>1125.91</td>
</tr>
<tr>
<td>5. Total Package Costs</td>
<td>49.00</td>
<td>33.14</td>
<td>113.08</td>
<td>107.60</td>
</tr>
<tr>
<td>DAP kg/ha</td>
<td>0.00</td>
<td>84.22</td>
<td>115.93</td>
<td>84.69</td>
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<td>DAP Birr/kg</td>
<td>0.00</td>
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<td>2.27</td>
<td>2.27</td>
</tr>
<tr>
<td>Urea kg/ha</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Urea Birr/kg</td>
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<td>0.00</td>
<td>0.00</td>
<td>1.47</td>
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<tr>
<td>5.d. Herbicide (Birr/ha)</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>5.e. Pesticide (Birr/ha)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.61</td>
</tr>
<tr>
<td>5.f. Fungicide (Birr/ha)</td>
<td>0.00</td>
<td>1.70</td>
<td>0.00</td>
<td>2.18</td>
</tr>
<tr>
<td>6. Interest (Birr/ha)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>11.06</td>
</tr>
<tr>
<td>7. Labor (Birr/ha)</td>
<td>387.00</td>
<td>240.50</td>
<td>532.58</td>
<td>448.11</td>
</tr>
<tr>
<td>7.a. Family, mutual labor (Birr/ha)</td>
<td>351.00</td>
<td>217.22</td>
<td>484.43</td>
<td>396.18</td>
</tr>
<tr>
<td>7.a.i. Family &amp; mutual labor days</td>
<td>78.00</td>
<td>48.27</td>
<td>107.65</td>
<td>88.04</td>
</tr>
<tr>
<td>7.b. Hired labor (Birr/ha)</td>
<td>36.00</td>
<td>23.28</td>
<td>48.15</td>
<td>51.93</td>
</tr>
<tr>
<td>8. Animal traction (Birr/ha)</td>
<td>261.00</td>
<td>103.13</td>
<td>92.38</td>
<td>100.3</td>
</tr>
<tr>
<td>9. Hand tools and sacks (Birr/ha)</td>
<td>8.90</td>
<td>89.64</td>
<td>90.45</td>
<td>141.49</td>
</tr>
<tr>
<td>9.a. Tools (Birr/ha)</td>
<td>3.10</td>
<td>3.03</td>
<td>2.80</td>
<td>2.92</td>
</tr>
<tr>
<td>9.b. Sacks (Birr/ha)</td>
<td>5.80</td>
<td>86.61</td>
<td>87.65</td>
<td>138.57</td>
</tr>
<tr>
<td>Net Margin/Hectare (3.-4.)</td>
<td>246.12</td>
<td>870.46</td>
<td>522.25</td>
<td>1318.99</td>
</tr>
<tr>
<td>Gross Margin/Hectare/Labor Day (3.-4.+7.a.)/7.a.i</td>
<td>7.66</td>
<td>22.53</td>
<td>9.35</td>
<td>19.48</td>
</tr>
<tr>
<td>Budget Item</td>
<td>Tech 1</td>
<td>Technology 2</td>
<td>Technology 3</td>
<td>Technology 4</td>
</tr>
<tr>
<td></td>
<td>Local seed, no fert.</td>
<td>Local seed plus DAP</td>
<td>Improved seed, DAP, and urea &lt; recomm.</td>
<td>Improved seed, DAP, and urea &gt;= recomm.</td>
</tr>
<tr>
<td></td>
<td>lower¹ upper</td>
<td>lower upper</td>
<td>lower upper</td>
<td>lower upper</td>
</tr>
<tr>
<td>1. Maize yield (kg/ha)</td>
<td>1835.00 2886.88</td>
<td>2921.77 4619.05</td>
<td>7060.26 5606.21</td>
<td>6237.74 5606.21</td>
</tr>
<tr>
<td>1.a. Adjusted maize yield (kg/ha)</td>
<td>1763.00 2829.72</td>
<td>2863.92 4527.59</td>
<td>6920.47 5495.21</td>
<td>6114.23 5495.21</td>
</tr>
<tr>
<td>2. Farmgate price of maize (Birr/ha)</td>
<td>952.02 1528.05</td>
<td>1546.52 2444.90</td>
<td>3737.05 2967.41</td>
<td>3301.69 2967.41</td>
</tr>
<tr>
<td>3. Total Variable Costs</td>
<td>705.90 652.95</td>
<td>1017.89 1122.10</td>
<td>1339.56 1358.87</td>
<td>1743.85 1743.85</td>
</tr>
<tr>
<td>4. Total Package Costs</td>
<td>49.00 219.69</td>
<td>302.48 421.14</td>
<td>441.20 568.60</td>
<td>579.62 579.62</td>
</tr>
<tr>
<td>5.a. Seed (Birr/ha)</td>
<td>49.00 33.14</td>
<td>44 107.6 113.08</td>
<td>142.97 147.04</td>
<td>172.42 172.42</td>
</tr>
<tr>
<td>5.b. DAP (Birr/ha)</td>
<td>0.00 186.55</td>
<td>256.78 187.59</td>
<td>195.39 254.50</td>
<td>258.05 258.05</td>
</tr>
<tr>
<td>5.c. Urea (Birr/kg)</td>
<td>0.00 0.00</td>
<td>0.00 125.34 130.55</td>
<td>170.05 172.42</td>
<td>258.05 258.05</td>
</tr>
<tr>
<td>5.d. Herbicide (Birr/kg)</td>
<td>0.00 0.00</td>
<td>0.00 84.69 88.21</td>
<td>114.9 116.5</td>
<td>116.5 116.5</td>
</tr>
<tr>
<td>5.e. Pesticide (Birr/kg)</td>
<td>0.00 0.00</td>
<td>0.00 0.61 0.00</td>
<td>0.00 0.00</td>
<td>0.00 0.00</td>
</tr>
<tr>
<td>6. Interest (Birr/kg)</td>
<td>0.00 0.00</td>
<td>0.00 0.00 1.48</td>
<td>1.48 1.48 1.48</td>
<td>1.48 1.48 1.48</td>
</tr>
<tr>
<td>7. Labor (Birr/ha)</td>
<td>387.00 240.50</td>
<td>532.58 448.11</td>
<td>468.95 458.22</td>
<td>830.31 830.31</td>
</tr>
<tr>
<td>7.a. Family, mutual labor (Birr/ha)</td>
<td>351.00 217.22</td>
<td>484.43 396.18</td>
<td>371.43 418.55</td>
<td>770.49 770.49</td>
</tr>
<tr>
<td>7.a.i. Family &amp; mutual labor days</td>
<td>78.00 48.27</td>
<td>107.65 88.04</td>
<td>82.54 93.01</td>
<td>171.22 171.22</td>
</tr>
<tr>
<td>8. Animal traction (Birr/ha)</td>
<td>261.00 103.13</td>
<td>92.38 100.3</td>
<td>186.65 146.13</td>
<td>122.12 122.12</td>
</tr>
<tr>
<td>9. Hand tools and sacks (Birr/ha)</td>
<td>8.90 89.64</td>
<td>90.45 141.49</td>
<td>216.53 172.20</td>
<td>190.62 190.62</td>
</tr>
<tr>
<td>9.a. Tools (Birr/ha)</td>
<td>3.10 3.03</td>
<td>2.80 2.92</td>
<td>4.72 4.01</td>
<td>3.49 3.49</td>
</tr>
<tr>
<td>9.b. Sacks (Birr/ha)</td>
<td>5.80 86.61</td>
<td>87.65 138.57</td>
<td>211.81 168.19</td>
<td>187.13 187.13</td>
</tr>
<tr>
<td>Net Margin/Hectare (3.-4.)</td>
<td>246.12 875.10</td>
<td>528.63 1322.80</td>
<td>2397.50 1608.54</td>
<td>1557.84 1557.84</td>
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<tr>
<td>Gross Margin/Hectare/Labor Day (3.-4.+7.a.)/7.a.i</td>
<td>7.66 22.63</td>
<td>9.41 19.52</td>
<td>33.55 21.79</td>
<td>13.60 13.60</td>
</tr>
</tbody>
</table>
Table 4. Budgets by Labor Use - Scenario 3, If fertilizer market is appointed by the regional govt. (hedonic model results)

<table>
<thead>
<tr>
<th>Budget Item</th>
<th>Tech 1 Local seed, no fert.</th>
<th>Technology 2 Local seed plus DAP</th>
<th>Technology 3 Improved seed, DAP, and urea &lt; recomm.</th>
<th>Technology 4 Improved seed, DAP, and urea &gt;= recomm.</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
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<td>2</td>
<td>22</td>
<td>28</td>
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<tr>
<td>1. Maize yield (kg/ha)</td>
<td>1835.00</td>
<td>2886.88</td>
<td>2921.77</td>
<td>4619.05</td>
</tr>
<tr>
<td>1.a. Adjusted maize yield (kg/ha)</td>
<td>1763.00</td>
<td>2829.72</td>
<td>2863.92</td>
<td>4527.59</td>
</tr>
<tr>
<td>2. Farmgate price of maize (Birr/ha)</td>
<td>3</td>
<td>0.54</td>
<td>0.54</td>
<td>0.54</td>
</tr>
<tr>
<td>3. Return</td>
<td>952.02</td>
<td>1528.05</td>
<td>1546.52</td>
<td>2444.90</td>
</tr>
<tr>
<td>4. Total Variable Costs</td>
<td>705.90</td>
<td>691.27</td>
<td>1070.64</td>
<td>1482.90</td>
</tr>
<tr>
<td>5. Total Package Costs</td>
<td>49.00</td>
<td>258.01</td>
<td>355.23</td>
<td>584.54</td>
</tr>
<tr>
<td>5.a. Seed (Birr/ha)</td>
<td>49.00</td>
<td>33.14</td>
<td>44</td>
<td>113.08</td>
</tr>
<tr>
<td>5.b. DAP (Birr/ha)</td>
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<td>224.87</td>
<td>309.53</td>
<td>235.52</td>
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<tr>
<td>DAP kg/ha</td>
<td>0.00</td>
<td>84.22</td>
<td>115.93</td>
<td>88.21</td>
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<tr>
<td>DAP Birr/kg</td>
<td>0.00</td>
<td>2.67</td>
<td>2.67</td>
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<tr>
<td>Urea Birr/kg</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>5.d. Herbicide (Birr/ha)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>5.e. Pesticide (Birr/ha)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.61</td>
<td>0.00</td>
</tr>
<tr>
<td>5.f. Fungicide (Birr/ha)</td>
<td>0.00</td>
<td>0.00</td>
<td>1.70</td>
<td>0.00</td>
</tr>
<tr>
<td>6. Interest (Birr/ha)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>7. Labor (Birr/ha)</td>
<td>387.00</td>
<td>240.50</td>
<td>532.58</td>
<td>448.11</td>
</tr>
<tr>
<td>7.a. Family, mutual labor (Birr/ha)</td>
<td>351.00</td>
<td>217.22</td>
<td>484.43</td>
<td>396.18</td>
</tr>
<tr>
<td>7.a.i. Family &amp; mutual labor days</td>
<td>78.00</td>
<td>48.27</td>
<td>107.65</td>
<td>88.04</td>
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<tr>
<td>7.b. Hired labor (Birr/ha)</td>
<td>36.00</td>
<td>23.28</td>
<td>48.15</td>
<td>51.93</td>
</tr>
<tr>
<td>8. Animal traction (Birr/ha)</td>
<td>261.00</td>
<td>103.13</td>
<td>92.38</td>
<td>100.3</td>
</tr>
<tr>
<td>9. Hand tools and sacks (Birr/ha)</td>
<td>8.90</td>
<td>89.64</td>
<td>90.45</td>
<td>141.49</td>
</tr>
<tr>
<td>9.a. Tools (Birr/ha)</td>
<td>3.10</td>
<td>3.03</td>
<td>2.80</td>
<td>2.92</td>
</tr>
<tr>
<td>9.b. Sacks (Birr/ha)</td>
<td>5.80</td>
<td>86.61</td>
<td>87.65</td>
<td>138.57</td>
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<tr>
<td>Net Margin/Hectare</td>
<td>246.12</td>
<td>836.78</td>
<td>475.88</td>
<td>1185.18</td>
</tr>
<tr>
<td>Gross Margin/Hectare/Labor Day (3.-4.+7.a.)/7.a.i</td>
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<td>21.84</td>
<td>8.92</td>
<td>17.96</td>
</tr>
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</table>
APPENDIX 4
REFERENCES


Yamano, T. 1999. Ph.D. candidate, Department of Agricultural Economics, Michigan State University, E. Lansing, MI, Personal communication.

