

Overview of MSU Research on Agricultural Inputs

Eric Crawford, Julie Howard, and Valerie Kelly
with
Cynthia Donovan and Duncan Boughton

Department of Agricultural Economics
Michigan State University

Prepared for Presentation at ICRISAT Workshop
Bulawayo, Zimbabwe, Nov. 27-29, 2000

Michigan State University, Dept. of
Agricultural Economics

Outline of Presentation

- Evolution of MSU research topics
- Conceptual framework for studying agricultural intensification--determinants and impacts
- Current research
- Major findings
- Major challenges (if time permits)

Michigan State University, Dept. of
Agricultural Economics

Evolution of MSU Research Topics

- Early studies that served as background:
 - Returns to agric. research and technology transfer
 - Determinants of agricultural productivity
 - Agricultural transformation
- Fertilizer and seed distribution and use
- Soil fertility and sustainable intensification
- Expanded conceptual framework, linking inputs systems with output markets
- Regions covered: West, East, Southern Africa

Michigan State University, Dept. of
Agricultural Economics

Evolution of Topics (2)

- Studies of returns to agricultural R&D in Africa
 - Cameroon, Kenya, Mali, Niger, Uganda, Zambia
 - Generally good rates of return
 - Highlighted importance of:
 - counting benefits and costs of investments that complement ag. R&D (extension, government support programs, etc.)
 - improved inputs, especially seeds
- Agricultural transformation
 - Need to transform the food system, not just farming
 - Market development is critical to this process
 - Need zone-specific technology and policies

Michigan State University, Dept. of
Agricultural Economics

Evolution of Topics (3)

- Determinants of agricultural productivity
 - Burkina Faso, Rwanda, Senegal, Zimbabwe
 - Results emphasized:
 - to raise productivity, need a sharp rise in use of improved agricultural inputs (fertilizer, seed, conservation investments)
 - farm productivity is linked to nonfarm productivity and environmental preservation
 - Study raised concern about the impact of structural adjustment on fertilizer and improved seed use
 - Farm input costs must be reduced without resorting to general subsidies that are not fiscally sustainable

Michigan State University, Dept. of
Agricultural Economics

Evolution of Topics (4)

- Fertilizer literature review:
 - Addressed the following questions:
 - Why is fertilizer not stimulating agricultural productivity?
 - How do seed systems evolve?
 - What can be done to improve the situation?
- Results:
 - Declining soil fertility is a major problem
 - More inorganic fertilizer is needed to address this
 - Fertilizer is profitable in many situations in Africa
 - Adoption depends on incentives and capacity
 - Vicious circle: high cost and low demand for fertilizer

Michigan State University, Dept. of
Agricultural Economics

Evolution of Topics (5)

- Seed literature review--questions addressed:
 - How do seed systems evolve?
 - What organizational and institutional strategies can be followed to improve seed systems?
- Recommendations:
 - Seed systems should combine formal & informal, and market & nonmarket channels, to meet farmers' demand
 - Effective demand by smallholders must be increased
 - Seed production and distribution costs must be reduced
 - Strengthen infrastructure, rules, and regulations
 - Government has a role to play throughout this process

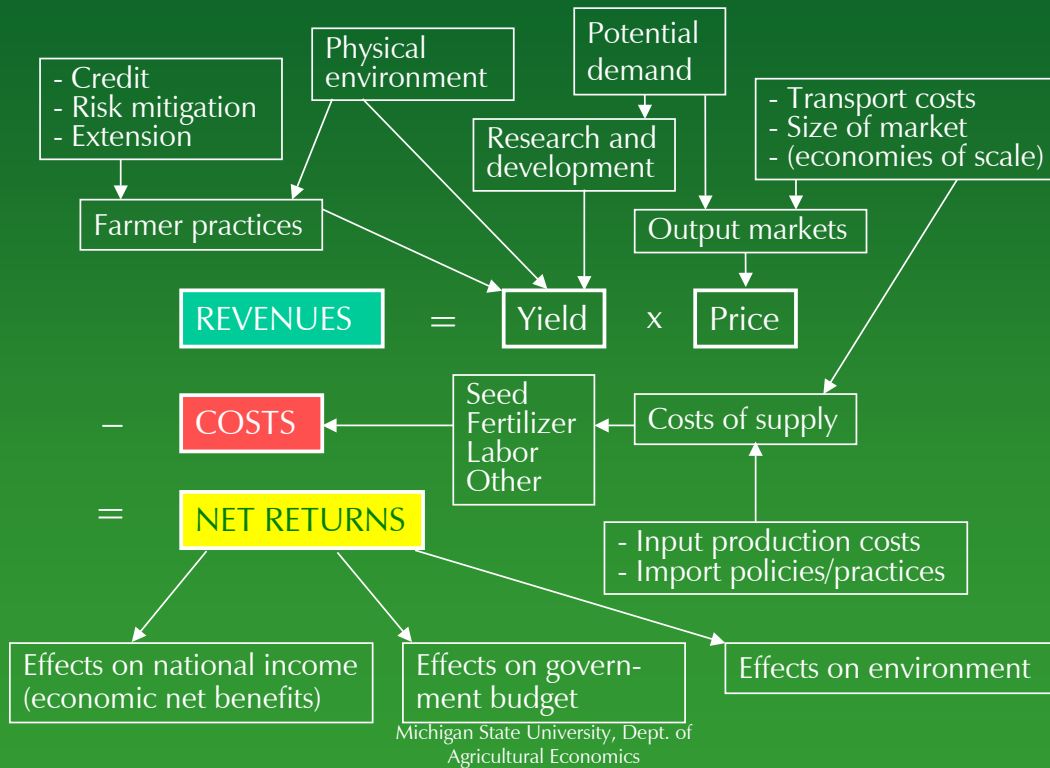
Michigan State University, Dept. of
Agricultural Economics

Evolution of Topics (6)

- Study on restoring soil fertility--issues addressed:
 - Capacity of fertilizer to recapitalize Sahel soil fertility
 - Economic obstacles and incentives to recapitalization
 - Need to avoid negative environmental impacts
- Findings/recommendations:
 - Inorganic and organic fertilizer are complements
 - Increased incentives needed to spur their use
 - Need for case studies of aggregate benefits and costs of input promotion programs
- Case studies in Ethiopia, Mozambique, Mali

Michigan State University, Dept. of
Agricultural Economics

Agricultural Intensification: Determinants and Impacts



Evolution of Topics (7)

- Integrated input/output marketing framework
 - Analysis of input/output marketing channels:
 - stages, agents, costs
 - farmer and trader marketing behavior
 - Identify ways to improve marketing systems to support greater use of fertilizer and seed:
 - look for potential cost savings throughout system
 - importance of vertical integration and links between credit and output marketing
 - market information systems
 - How does cash cropping support food crops?

Evolution of Topics (8)

- Market reform--questions addressed:
 - Impact of liberalization and privatization on input and output markets
 - Pathways for increasing private sector involvement in input and output marketing
- Results:
 - Impact mixed; many reforms partially implemented
 - Little investment in complementary public goods
 - Preconditions for improved market performance therefore not yet put in place

Michigan State University, Dept. of
Agricultural Economics

Current Research

- Profitability of fertilizer use (Rwanda, Zambia)
- Fertilizer marketing costs (Kenya, Zambia, Rwanda; West Africa)
- Fertilizer distribution and credit (Zambia)
- Constraints and strategies for input sector development (Mozambique)
- Analyzing risks of improved input use and ways to reduce farmer/trader risk (Ethiopia, Mali)

Michigan State University, Dept. of
Agricultural Economics

Current Research (2)

- Aggregate benefit-cost analysis of input promotion programs (Ethiopia, Mali)
- Use of monetized food aid to stimulate improved input use
- Analysis of farm income and land holdings to identify viable target groups for intensification

Michigan State University, Dept. of
Agricultural Economics

Major Findings (1)

- Adoption of improved technology requires:
 - incentives to adopt (absolute & relative profitability)
 - capacity to adopt (needed resources are available)
- Sustained use of improved technology requires:
 - well-functioning input and output markets
 - high-quality extension services
 - financially sound credit systems (farmers & traders)
 - protection against financial risks (farmers & traders)
- Smallholders generally require credit, but early adopters & better-off farmers may self-finance

Michigan State University, Dept. of
Agricultural Economics

Major Findings (2)

- Structural reforms have left input markets in a low-demand, low-volume, high-input-cost trap
- Private sector input traders are put off by high costs, policy uncertainty/risk, and competition from free input giveaway programs
- Input and output markets work best when:
 - functions are vertically coordinated
 - credit and output markets are interlinked, allowing input loans to be recovered from sales of output

Michigan State University, Dept. of
Agricultural Economics

Major Challenges (1)

- How to bring down the real costs of input supply?
 - Economies of scale to reduce unit costs
 - Cash crop schemes to facilitate coordination of marketing, credit, and extension
 - Collaboration between farmer associations, NGOs, and for-profit firms
 - Targeting of better-off smallholders where substantial effective demand exists

Michigan State University, Dept. of
Agricultural Economics

Major Challenges (2)

- How to boost demand for improved inputs?
 - Support “demand-driven” input and output markets
 - I.e., support shifts in cropping patterns in line with post-reform economic institutions and price relations
- Examples:
 - Sorghum vs. maize in remote areas of Zambia
 - “Nontraditional” crops for which there is strong commercial demand in domestic or export markets

Michigan State University, Dept. of
Agricultural Economics

Major Challenges (3)

- How to reduce risks?
 - Crop combinations and conservation technologies appropriate for riskier environments
 - Institutions and organizations to spread risk among farmers and input suppliers
 - More stable and transparent government policies
 - Fewer subsidized input supply programs that undercut private sector commitment to input marketing
 - Find solutions to problems of late fertilizer delivery
 - Explore potential for area or rainfall insurance

Michigan State University, Dept. of
Agricultural Economics