Is the Share of Agricultural Maintenance Research Rising?

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What is maintenance research?
- Maintenance research replaces existing research results that have degraded or deteriorated due to changes in the base conditions resulting in a loss of productivity, efficiency, or other realized past gains. This is in contrast to productivity-enhancing research which increases theoretical yield boundary.
- The elimination of maintenance research could result in as much as a 25% reduction in productivity in as little as five years and up to 40% over fifteen years. An overall agricultural productivity gain, a growing proportion of research must be devoted to maintenance research so that the productivity gains realized will not be lost to deterioration.
- Adnani and Nolle(1) found that 34.8% of agricultural research on commodities was devoted to maintenance research in 1986.
- Research benefits cannot be measured purely in terms of output gains, but must also be measured in terms of losses avoided. Failure to do so will undermine the reuse of research.

Agricultural Productivity

![Graph showing the relationship between maintenance research and agricultural productivity over time.]

Objectives
1. Measure the current amount of agricultural research for commodities involved in maintenance research and compare this to the 1986 estimate.
2. Measure the current amount of agricultural research for non-commodity areas involved in maintenance research.
3. Develop an empirical model to explain what factors are responsible for maintenance research expenditures.

Methods
- National survey of agricultural research scientists in 2008:
  - Surveyed percentage of research devoted to maintenance research by commodity or non-commodity area and discipline.
  - Assessed examples of factors causing research deterioration, emphasizing maintenance research.
- For the empirical model, survey results were used to define:
  - Specific Knowledge Areas within USDA's Current Research Information System as maintenance research for the dependent variable.
  - Explanatory variables chosen from categories of research funding, climatic conditions, pest and pathogen control, and agricultural production.

Empirical Model

Maintenance Research as % of Total Research

- Maintenance Research is increased in the attempt to develop more productivity-enhancing research than it once did.
- Influences maintenance research expenditure over long run by:
  - annual cost of changes in nutrient requirements due to genetic modifications/selective breeding and internal changes in regulatory restrictions, input prices, or other market forces (11%)
  - changes in temperature, climate, environmental factors, and pollution (17%)
  - changes in pest population and resistance to pesticides (15%)
  - maintenance and repair of roads, dams, and other public works
  - food and beverage and animal and pest production

Examples of Research Deterioration from Survey (response rate)

- Table showing the percentage of scientists who reported research deterioration.

Conclusions
1. Maintenance Research influenced over long run by:
   - annual cost of changes in nutrient requirements due to genetic modifications/selective breeding and internal changes in regulatory restrictions, input prices, or other market forces (11%)
   - changes in temperature, climate, environmental factors, and pollution (17%)
   - changes in pest population and resistance to pesticides (15%)
   - maintenance and repair of roads, dams, and other public works

References