Labor and Technology Change in the Nursery Industry

Vera Bitsch and Steven Buccola

Department of Agricultural, Food, and Resource Economics
Michigan State University
306 Agriculture Hall
East Lansing, MI 48823
517-353-9192
bitsch@msu.edu

Department of Agricultural and Resource Economics
Oregon State University
240D Ballard Extension Hall
Corvallis, OR 97331
541-737-1410
s Buccola@oregonstate.edu

Poster prepared for presentation at the Agricultural & Applied Economics Association 2010
AAEA, CAES, & WAEA Joint Annual Meeting, Denver, Colorado, July 25-27, 2010

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U.S. Nursery Industry
Product sales of $6.6 billion
- 58% production in top 5 states
- Top 3 states: CA—$1,689 million, FL—$848 million, OR—$758 million
Demand for nursery products is commercial, municipal, residential
- Construction
- Maintenance
Buyers of nursery products
- Retail nurseries
- Garden centers, department stores
- Landscape suppliers, landscapers
- Others (e.g., other production nurseries, municipalities, residential customers)

Objectives
The nursery industry depends on inexpensive labor, for which it competes with the construction industry.
Pressures to mechanize stem from both the expectation and the risk of declining labor availability.
To understand these impending shifts, we need a model of how new technologies substitute for labor skill, as well as for labor quantity.

Methods
- Literature review of capital and labor, as well as capital and skill trade-offs
- Case studies of three production nurseries in Oregon
- Key-informant interviews of industry stakeholders

Technology Change & Impact
Stylized model of trade-off among capital, low-skilled labor, and high-skilled labor

Uni-modal Hypothesis: New capital substitutes for low-skilled labor, but is complementary with high-skilled labor.
Substitutive technologies are those which reduce the cost of routine manual steps like reaching for potting material. Complementary technologies are those which reduce the cost of such management-relevant information as inventory reports.

Bi-modal Hypothesis: New capital substitutes for mid-skilled labor, but is complementary with low-skilled and – especially – high-skilled labor.
Here, technology reduces the relative cost of routine cognitive steps characteristic of mid-skilled work.

Mechanization in Agriculture
Early examples are grain and root-vegetable harvesting, e.g., sugar beets, potatoes.
The end of the Bracero “guest worker” program, 1964, led to a push toward specialty crop harvest mechanization, e.g., processing tomatoes, tart cherries, and prunes.
Public funding came almost to a halt in the 1980s and 1990s due to controversy.
Since 2008, renewed funding through specialty crop grants; current projects under leadership at Carnegie Mellon and Washington State Universities.

Oregon Labor Developments
Oregon’s agricultural wage was $11.61 in 2009 (NASS), among the highest in U.S.
More workers are employed for longer periods; short-term employment falling (Ag Census),
61% of farm workers are unauthorized, 19% are newcomers (<1 year); for 92%, Spanish is the main language (NAWS, Western States).
99% of Oregon farm workers live off-farm, 51.8% in “substandard” housing (Holden et al.).

Nursery Production in Oregon
Typical nursery has 200 – 400 differentiated products.
Advantages: Climate, water availability.
Disadvantages: Labor costs, distances to major consumer centers.

Conclusions
As capital costs decline and wage growth is expected to persist, pressure continues for capital intensification in the now labor-intensive nursery sector.
But capitalization is complicated by nursery product variety. It is complicated also by rising buyer power, boosting the pressure for higher product quality and lower price.
The rate and pattern of labor substitution will depend on:
- Signs of changes in low-skilled labor supply, and
- Relative costs of new technologies that substitute for routine manual and cognitive tasks.

Acknowledgments
We thank all our interview partners for their cooperation and candidness.

For Further Information
Vera Bitsch, 306 Agriculture Hall, Agricultural, Food, and Resource Economics, Michigan State University, East Lansing, MI 48824, 517-353-8792 or vbitsch@msu.edu
Steve Buccola, 240D Ballard Extension Hall, Agricultural and Resource Economics, Oregon State University, Corvallis, OR 97331, 541-737-1410 sbuccola@oregonstate.edu

Overhead irrigation
Hand irrigation
Drip irrigation
Drip irrigation
Drip irrigation

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Vera Bitsch1 and Steven Buccola2
1Department of Agricultural, Food, and Resource Economics, Michigan State University
2Department of Agricultural and Resource Economics, Oregon State University