

BIOAG PROJECT FINAL REPORT, JUNE 30, 2013

TITLE: EVALUATING YIELDS AND PROFITABILITY OF SMALL-SCALE ORGANIC AND BIOINTENSIVE VEGETABLE PRODUCTION IN WASHINGTON

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KEY WORDS: ORGANIC, BIOINTENSIVE, ORGANIC VEGETABLES, PROFITABILITY, RECORD KEEPING

ABSTRACT: This project addressed Washington State University's (WSU) Center for Sustainable Agriculture and Natural Resources' priority area of assessing economic sustainability of agriculture and food systems. As a tool for self evaluation, a vegetable yield data bank was made available to small-scale sustainable/organic vegetable farmers, researchers and extension workers. We developed a user-friendly Excel worksheet to assist small-scale organic/sustainable farmers in evaluating their per crop and/or whole-farm costs, labor productivity and profitability. These worksheets were tested among a sample of small-scale organic/biointensive vegetable growers and with students enrolled in an organic agriculture course. The P.I. developed and taught a new economics section in Soils 480, Practicum in Organic Agriculture, during spring semester 2013. The worksheets and organic vegetables yield data base were presented in a WSU Horticulture Department seminar in spring semester 2013. Yield and cost record keeping at the WSU organic farm were systematized by a student supported by the project working under the supervision of the PI and Cooperator Jaeckel. It is hoped that future economic evaluations permitted by these records will enrich the learning experience of student volunteers and increase the breadth of research at the learning site. The yields data base and economic worksheets will be posted in the CSANR and WSU Extension web sites.

PROJECT DESCRIPTION

OUTPUTS

- **Work Completed:**

Objective 1: To assemble a data bank of vegetable yields from the literature to permit organic/biointensive farms and research sites to self-evaluate their yield performance.

See first publication listed below. The yields in Galinato and Young (2012) were assembled from the four references listed below with annotations.

[1] Antonelli, A., R.S. Blyther, S.J. Collman, R.E. Thornton, and R. Van Denburgh. 2004. *Home Gardens*. Washington State University Extension Publication EB0422. Out of print, revised version forthcoming in 2013 from <http://cahnrsdb.wsu.edu/newdirectory/individualDisplay.aspx?personID=453miles@wsu.edu> EB0422 provided yields for 36 vegetables mainly typical of western Washington using organic methods.

[2] Jeavons, J. 2006. *How to Grow More Vegetables*, 7th ed. New York: Ten Speed Press. Jeavons, the "father of biointensive gardening," published the 1'st edition of this classic in 1974. Biointensive gardening aims to "maximize the effectiveness of time and space in the smallest-scale growing area" (p. 81). The book provides yield estimates for 60 organic vegetables and many grain, oilseed, and fodder crops. Galinato and Young (2012) list

Jeavons' vegetable yields for "beginner, good, and excellent" biointensive gardeners. Yields vary greatly by gardener proficiency and soil quality. For example, Jeavons lists beginner cucumber yield 1.6 lbs/sq ft versus excellent at 5.8 lbs/sq ft. Galinato and Young also include average U.S. (mainly nonorganic) vegetable yields as summarized by Jeavons from USDA, *Agricultural Statistics*.

- [3] Wiswall, R. 2009. *The Organic Farmer's Business Handbook: A Complete Guide to Managing Finances, Crops and Staff -- and Making Profit*. Vermont: Chelsea Green Publishing. Galinato and Young (2012) list the 26 vegetable and herb yields that Wiswall records as typical of his Vermont farm. Climate and soil limitations in Vermont generally produce lower yields than for other locations.
- [4] Vesey. n.d. *Vegetable Planting Chart*. <http://www.veseys.com/us/en/learn/reference/plantingchart> Galinato and Young (2012) list the 36 vegetable and herb yields from Vesey. This source also provides detailed spacing information.

The research team concluded that WSU's Organic Farm yields were between Jeavons' "beginner" and "good" levels, and slightly lower than Antonelli's and Vesey's.

Objective 2: To develop and test an Excel questionnaire and economic performance report to permit organic/biointensive farmers to self-evaluate their per vegetable and whole-farm costs, profitability, and labor productivity.

The questionnaire and economic performance report have been completed as listed in second product below. The economic performance report retrieves information from the farmer's answers to the questionnaire and uses Excel formula to compute his/her costs, time per operation, wages/hour and profit for the entire farm and by vegetable. Questionnaires were successfully pretested with two organic farmers in Whatcom County identified by cooperator Miles, and subsequently revised. Further pretesting and revision was provided by use of the questionnaires in an assignment by 24 students enrolled in Soils 450. These pretests indicated that only electronic spreadsheets were needed. Questionnaires and reports were developed for Excel versions 1997-2003 and 2007-2010 to accommodate software of different users. The questionnaire and report are available as an unpublished Appendix from dlyoung@wsu.edu.

Objective 3: To strengthen economic record keeping at WSU's organic farm.

Hatti Hannak, under supervision of Jaeckel and Young, was hired with project funds to develop record keeping forms and summarize recent crop yields, harvest quantities, labor time for different crops by operation, variable costs by crop, and sales prices by crop. A record of prices received for WSU organic farm produce sold at Pullman's Wednesday afternoon farmer's market was compiled.

Objective 4. To incorporate a new economics section in WSU's Soils 480.

Young developed and taught a week-long economics section to 24 students enrolled in Soils 480, Practicum in Organic Agriculture, during spring 2013. Young utilized the questionnaire, yield lists, labor time records, and price summaries to teach basic record keeping. He also taught fundamental accounting principles used to compute variable and fixed costs, farmers' wages/hour and profit per year by crop and by whole farm. Young discussed how profit and wage comparisons can permit organic farmers to improve their economic performance in the future. Each student in Soils 480 was assigned to complete the questionnaire for a real or

imagined organic farm or garden and to interpret their economic performance report. Young graded and provided detailed comments on each student's work. Some students were asked to redo the questionnaire when their work showed inadequate understanding of basic concepts or questionnaire use.

Objective 5. To disseminate the data bank and Excel questionnaires in a Horticulture Department seminar, in Soils 480, and an extension bulletin.

Completed. At Cooperator Miles' suggestion, the P.I. substituted a Horticulture Department seminar on February 14, 2013 for the originally anticipated distance education Cultivating Success lecture. Training and logistics for the latter were not offered during spring 2013. As noted above, Soils 480 was taught in Spring 2013. After considerable input from pre-testers and others, the P.I. decided to include all instructions for the questionnaire within the document itself. Consequently, a print extension "user's manual" would be superfluous. The detailed instructions included in the Excel questionnaire reflect considerable useful input from pretesters.

The P.I. is continuing to provide assistance to users who email him regarding questions related to filling out the questionnaire or interpreting the economics performance results. If this follow-up assistance to clientele requires considerable time, the P.I. will apply for a CSANR Outreach/Extension Curriculum Mini-Grant in the future.

- **Publications, Handouts, Other Text & Web Products:**

Galinato, S. and Young. 2012. *Average Yields from Multiple Sources of 87 Vegetables and 34 Grains*. CSANR-BioAg Economics Project Paper 2012-1. Available from dlyoung@wsu.edu and CSANR web site.

Young, D. 2012. Whole-Farm and per Vegetable Questionnaire and Economic Performance Report for Small-Scale Organic Vegetable Farmers. Excel Spreadsheet. Available from dlyoung@wsu.edu and CSANR web site and CSANR web site.

Young, D. 2012. Record Keeping Form for Koppel Farm Gardeners, Excel Spreadsheet.

Hannak, M. 2012. Summary of Prices by Date for 48 WSU Organic Farm Vegetables and Fruit Sold at Pullman Farmers Market During Summer 2012.

- **Outreach & Education Activities:**

Young, D. 2012. Role of Sustainable Gardening in Environmental Protection. Panel member at Center for Civic Engagement meeting, WSU CUB, April 18, 2012.

Young, D. 2012. Introduction of Organic Farming Questionnaire to Gardeners at Pullman Community Gardens at Koppel Farm. May 18, 2012.

Young, D. 2012. Overview of Economic Study for Small-scale Organic and Biointensive Farms. Oral presentation, WSU Organic Farm Field Day, July 26, 2012.

Young, D., S. Galinato, M. Hannak, B. Jaekel, and G. Pickart. 2012. *How Do Your Organic Vegetable Yields Stack Up?* Poster presented at WSU Center for Sustaining Agriculture and Natural Resources 30th Anniversary Symposium, December 6, 2012, Washington State University.

Young, D. 2013. Taught economic module in WSU Soils 450, Organic Agriculture Practicum, to 24 students, February 13.

Young, D. 2013. Procedures for evaluating profitability of small-scale organic vegetable farms. WSU Horticulture Department seminar, powerpoint presentation, February 14.

IMPACTS

- **Short-Term:**

Some participants at the Center for Civic Engagement meeting, at the WSU Organic Farm Field Day, and at CSANR's 30th Anniversary Symposium told the P.I. that it was high time to incorporate more business and economics training for organic farmers and organic agriculture students. Some argued that many organic farming enthusiasts enter the industry for environmental, food safety, and political/philosophical reasons. These organic enthusiasts later recognize that business and economics skills are necessary if they are to survive. The importance of business skills was strongly seconded by the organic farmers who pretested our questionnaire. Given the dearth of economics and business analysis in previous CSANR BIOAg research grants, a short-term impact of this grant has been to raise the visibility of economics and record keeping in the organic agriculture industry in WA and at WSU's organic farm.

Teaching economics to some of the 105 Pullman Community Gardeners at Koppel Farm during 2012 was not a formal objective of this project, but the P.I. attempted it. This effort failed. Only one gardener committed to keep the extensive labor input, cost, and harvest records required. The vast majority considered record keeping overly tedious. It was clear that hobbyist vegetable gardeners at Koppel grow vegetables primarily for non-economic reasons. These include obtaining outdoor exercise, enjoying watching plants grow, exposing children to gardening, keeping their sanity after a day's office work, becoming better and more efficient gardeners over time, and increasing their knowledge of the science of horticulture. Several gardeners felt they were providing their families safer and fresher produce. Some desired to save money on their household food bill, but they apparently were not interested in rigorously quantifying this saving.

- **Intermediate-Term:**

Cooperator Carol Miles will use the questionnaire and economic performance report in a two-year research program with MS student Charlene Grahn on leafy green vegetables in NW Washington. Other intermediate-term impacts will be better measured in a couple years.

- **Long-Term:**

These impacts will be better perceived a few years following the completion of the project. It is expected that impacts will include fewer business failures from undercapitalized and inexperienced small scale organic farmers who lack business skills. It is also expected that existing small scale organic farmers will increase their profits by dropping less profitable crops,

making more efficient use of their labor, and cutting fixed costs by selling unneeded machinery. Others may boost labor productivity by purchasing needed power or manual machinery.

ADDITIONAL FUNDING APPLIED FOR / SECURED

None

GRADUATE STUDENTS FUNDED

No graduate students were funded, but undergraduates Matti Hannak and Laurie Mooney were employed by the project at the WSU organic farm, and Ashley Quimby at WSU Mount Vernon NWREC.

RECOMMENDATIONS FOR FUTURE RESEARCH

Research for this project revealed that many small-scale Washington organic farms and ranches are integrated crop and livestock operations. This makes economic and environmental sense because organic feed crops can support organic livestock and livestock waste can provide nutrients to organic crops. Furthermore, many Washington organic farms and ranches have land suitable for both livestock pastures and crop fields. Future research might develop procedures for examining the profitability, labor use efficiency, and land use efficiency of integrated crop and livestock organic operations.

UNPUBLISHED APPENDIX

COPY OF EXCEL QUESTIONNAIRE AND ECONOMICS REPORT

These Excel items are available on request from dlyoung@wsu.edu . The distributed Appendix uses fictitious data for purposes of illustration. Users will enter their own information in colored sections of the questionnaire when analysing their own organic farm.