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Economic Feasibility of Once-over Bud Harvest of Standard Chrysanthemums[1]

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Abstract. **Traditional methods of harvesting were compared to a once-over bud harvest of standard chrysanthemum (*Chrysanthemum morifolium* Ramat. cv. May Shoesmith). Despite greater direct labor and material requirements, once-over bud harvesting resulted in net returns that were 11 to 17% greater than that for traditional flower harvesting. The economic feasibility of bud harvesting was more dependent on potential productivity increases rather than the additional labor and opening area requirements necessary for bud harvesting.**

Increasing fuel costs and other major cost inputs have forced standard chrysanthemum growers and shippers to seek alternatives in reducing production, handling, and transportation costs to maintain economic viability. The basic short-term methods of attaining these cost reductions involve reducing average unit costs by either increasing the number of stems per shipping unit and/or increasing the output in stems per production area unit. Previous research has indicated that bud harvesting and shipping of cut flowers have the potential of reducing both cost components (6).

Cultural aspects of commercially bud harvesting standard chrysanthemums have been well documented (1, 3, 4, 5). While many of the potential economic incentives for implementing the bud harvesting technology have not been quantified, previous research has indicated that shipping bud harvested standard chrysanthemums has a substantial impact on the reduction of unit transportation costs (4). The objectives of this research centered upon quantitative evaluation of the effect of the bud harvesting technologies on reducing unit production and handling costs and the corresponding impact on net returns.

The economic efficiency regarding the labor and space requirements for traditional flower harvesting was compared to that of bud harvesting to determine the economic advantages of each. While traditional flower harvesting involved the selective harvest of mature flowers only, bud harvest was a complete, once-over harvest when 50% of the flowers were 50 mm or greater in diameter. To determine space and labor requirements for the two harvesting technologies, a time and motion study was conducted involving the production and harvesting of 9.0 m^2 of 'May Shoesmith' standard chrysanthemums. Input requirements other than labor and opening area were obtained from a sample population of Ohio standard chrysanthemum growers. This information was used in a simulated cost analysis of .405 ha (1 acre) standard chrysanthemum production operation.

The bud harvested crop was placed in an opening solution that consisted of 2% sucrose, 200 ppm 8-hydroxyquinoline citrate, and tap water. The bud opening area had 540–1080 lux of continuous fluorescent light and a temperature range of 22–26°C.

Direct material requirements. Results indicated the direct material costs for bud harvesting standard chrysanthemums were 36% greater than traditional flower harvesting costs with three crops per year and 25% greater than flower harvesting with 3.25 crops per year (Table 1). For once-over bud harvested standard chrysanthemums achieving 3.9 crops/year, direct material cost/ha averaged $143,360 compared to $105,482/ha (3.0 crops/year) and $114,253/ha (3.25 crops/year) for flower harvested chrysanthemums.

Space requirements. Utilizing floor area in the time and motion experiment, the opening area requirements for bud harvested chrysanthemums were determined to be 25 stems/m^2 of floor area. For a .405 ha (1 acre) production facility, with an average monthly output of 27,000 marketable stems, the opening area requirements were determined to be a max of 160 m^2. The availability of this amount of opening area in current commercial operations was found to be highly variable depending on the ability of individual producers to utilize storage, shaded greenhouse, or unused area in opening buds.

Direct labor requirements. Direct labor requirements for once-over bud harvest of standard chrysanthemums were 37% greater than that for traditional flower harvested chrysanthemums (Table 2). For bud harvesting, the labor costs per 1,000 blooms were $13.15 compared to $8.25 per 1,000 blooms for flower harvested chrysanthemums. While the once-over bud harvest involved less initial harvest labor, it required more direct labor for placement of the cut buds into buckets at harvest and later removal from the buckets at maturity.

However, the once-over harvest and easier handling of bud cut flowers result in greater adaptability of labor specialization in the performance of individual harvesting and handling operations. These benefits are not reflected in the costs estimates because the greater labor efficiency as a result of bud harvesting would vary among individual operations depending on the ratio of part-time to full-time labor as well as how effective labor is utilized.

Overhead expenses. Other variable costs for a .405 ha (1 acre) standard

Table 1. Material costs for standard chrysanthemum production, bud and flower harvest, Ohio, 1975.

Item	Flower harvest				Bud harvest	
	3.00 crops/year		3.25 crops/year		3.90 crops/year	
	($/ha)	(%)	($/ha)	(%)	($/ha)	(%)
Cuttings[z]	97,186	92.0	105,286	92.0	126,342	88.1
Soil Conditioners[y]	853	.8	924	.8	1,107	.8
Fertilizer[x]	2,113	2.0	2,268	2.0	2,731	1.9
Fungicides	502	.5	544	.5	652	.4
Insecticides	736	.7	798	.7	956	.7
Marketing Supplies[w]	4,092	4.0	4,433	4.0	11,572	8.1
Total	105,482	100.0	114,253	100.0	143,360	100.0

[z]Cutting costs were calculated at $.095/cutting.

[y]Includes straw.

[x]Includes a liquid feed analysis of 14-0-15.

[w]Includes cellophane sleeves for flower stage harvest and both cellophane and preservative for bud harvest.

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Table 2. Direct labor requirements for standard chrysanthemum production, bud and flower harvest, 1975.[z]

Item	Flower harvest min/1000 stem	Flower harvest $/1000 stems	Bud harvest min/1000 stem	Bud harvest $/1000 stems
Initial Harvest[y]	134	6.70	89	4.45
Handling[x]	33	1.65	81	4.05
Bucket Harvest[w]	–	–	93	4.65
Summary[v]	167	8.35	263	13.15

[z]Includes marketable stems only.

[y]Includes harvest and stripping.

[x]Includes handling, transport, and placement in buckets.

[w]Harvesting from buckets at maturity.

[v]Total man minutes of direct labor at $3/hour.

Table 3. Overhead expenses for standard chrysanthemum production, .405 ha (1 acre), Ohio, 1975.

Item	Flower harvest ($/ha)	Flower harvest (%)	Bud harvest ($/ha)	Bud harvest (%)
Direct Labor[z]	86,479	44	90,319	45
Indirect Labor[y]	30,011	15	30,011	15
Fuel (Heating)	64,583	33	64,583	32
Fuel (Trucking)	4,942	3	4,942	3
Electricity	6,178	3	6,178	3
Telephone	1,236	1	1,236	1
Misc. Services[x]	741	–	741	–
Offices Expenses	494	–	494	–
Miscellaneous[w]	1,236	1	1,236	1
Total	195,900	100	199,740	100

[z]Includes hourly paid labor only.

[y]Includes all indirect labor expenses paid by the employer such as insurance, bonuses, and pension plans.

[x]Includes trash removal and legal services.

[w]Includes dues, subscriptions, advertising, promotion, and other miscellaneous expenses.

chrysanthemum facility are summarized in Table 3. Labor and heating fuel were the major cost components and accounted for approximately $18.00/m^2 of the total greenhouse area or 92% of the total overhead expenses. The bud harvest expenses reflected only additional labor requirements associated with bud harvesting. It was determined that the remaining expense items would be fixed at the same level whether implementing bud or traditional flower harvesting.

Net returns. Utilizing revenue information from the surveyed Ohio operations, once-over bud harvesting offered net returns to management as much as 17% greater than that for current flower harvesting practices (Table 4). Actual net returns were almost 66 fold greater for the bud harvesting technology. These returns converted to an annual return on investment of less than 6% for flower harvesting and almost 25% for bud harvesting. Increases in output from bud harvesting more than compensated for corresponding increases in variable costs. Bud harvesting was the most economically efficient system for standard chrysanthemum production because it enabled producers to increase gross revenue through greater productivity. Consequently, productivity gains were a more important determinant in considering the overall economic potential of the bud harvesting technology than additional material and opening area requirements. For select chrysanthemum producers, the bud harvesting technology may not offer the economic incentive necessary for implementation because of possible capital investment in opening facilities.

These results are intended to demonstrate the relative differences in profitability between the two harvesting technologies and not to demonstrate absolute levels of profitability. Lower levels of efficiency would result in a higher break-even point and reduced net returns to management. Productivity levels and prices greater than those in this analysis would result in even greater relative differences in economic returns.

Table 4. Net returns to management for standard chrysanthemum production, bud and flower harvest, Ohio, 1975.

Item	Flower harvest 3.00 crops/year ($/ha)	Flower harvest 3.00 crops/year (%)	Flower harvest 3.25 crops/year ($/ha)	Flower harvest 3.25 crops/year (%)	Bud harvest 3.90 crops/year ($/ha)	Bud harvest 3.90 crops/year (%)
Gross Revenue[z]	484,706	100	525,054	100	630,065	100
Annual Fixed Costs[y]	181,725	38	181,725	35	181,725	29
Direct Material Costs	105,482	22	114,253	22	143,360	23
Overhead Expenses	195,900	40	195,900	37	199,740	31
Net Returns to Management	1,599	–[x]	33,176	6%	105,240	17%
Return on Investment		–[x]		8%		25%

[z]Using an average annual price of $4.74/10 pack.

[y]Derived using the initial investment costs developed by Kirschling and Jensen (2) with a cost adjustment to reflect a standard chrysanthemum production facility in 1975. The investment costs were $422,096 for .405 ha (1 acre) operation.

[x]Less than 1%.

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