GLADIOLUS PRODUCTION COSTS AND RETURNS IN SOUTHWEST FLORIDA

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ABSTRACT

Informal interviews were conducted with gladiolus growers in various farm-size categories to determine the kind and amount of production inputs necessary to produce flowers successfully for the cut-flower market. The purpose of the study was to analyze the most common production practices in order to estimate costs for the amounts of labor, machinery (both field and stationary) and materials required to perform each separate operation. Total production costs were calculated by summing the costs of the individual operations. All costs which could be quantified were included and the returns were handled as residuals.

The yearly labor flow was also tabulated to determine peak periods of labor usage and the number of workers required each month.

INTRODUCTION

In June 1970 the research committee of the Florida Flower Association requested a follow-up study be made of Brooke's reports (1, 2) on labor and material requirements for gladiolus. The present study was to determine the cost of labor, machinery, materials and facilities required to grow gladiolus in southwest Florida.

METHODS

In order to generate meaningful labor and machinery coefficients (e.g., hours per acre), a specific farm size (planted acreage) must be assumed and then an appropriate labor and machinery complement may be assigned. In this paper a "typical" farm of 325 acres, based on the approximate average gladiolus farm size in the 1969-70 crop year, was arbitrarily selected. Most producers of gladiolus in Florida operate farms which are either well above or below this acreage; however, most of the information on labor and machinery efficiency was obtained from larger growers. Therefore, the cash cost estimates fit most of the efficient producers in Florida without regard to farm size.

Data were collected from gladiolus growers, research personnel of the Florida Agricultural Experiment Stations, industry representatives, the Soil Conservation Service and specialists with the Cooperative Extension Service. All prices paid for facilities, machinery and materials were based on present prices and reflect an amount of bargaining power which may be expected of a farmer in the farm size range who had greater than $500,000 in gross receipts from gladiolus.

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DISCUSSION

The initial investment in machinery, buildings and equipment, irrigation and drainage and investment in bulbs is shown in Table 1. Included in the field machinery category are 7 tractors, a large self propelled sprayer, 7 large trucks, 4 pickup trucks and 23 other implements. The stationary equipment includes: 1) the latest automated bulb-cleaning machinery; 2) cold storage for 22,000 blub trays; and 3) flower packing equipment and other necessary machinery. The irrigation and drainage requirements are based on Soil Conservation Service specifications for southwest Florida's flatwoods soils. The investment in bulbs of $780 per acre is based on planting 39,000 bulbs per acre.

Annual operating costs include repairs, maintenance and electricity. Field machinery operating costs are charged at an hourly rate based on expected life and proper maintenance of the equip-

Table 1.--Estimated initial investment, annual fixed cost and annual operating cost of field machinery, buildings and stationary equipment, irrigation and drainage and bulbs required in the production of gladiolus on a "typical" 325 acre farm in southwest Florida

Item	New cost	Annual fixed cost[a]	Annual operating cost
	Dollars	Dollars	Dollars
Field machinery	146,450	31,467	charged hourly
Buildings & stationary equipment	297,185	41,177	7,593
Irrigation & drainage	61,736	11,596	7,665
Bulbs	253,500	20,939[b]	50,700[c]
Total	758,871	105,179	65,958
Per acre cost	2,335	324	203

[a]Annual fixed cost includes straight line depreciation, interest on average investment calculated at 8.26 percent and taxes and insurance at 1 percent of new cost on equipment and 2 percent on buildings.

[b]Bulbs are charged an opportunity interest rate of 8.26 percent.

[c]This amount is a 20 percent replacement rate per year.

Table 2.--Estimated preharvest, harvest and postharvest labor and machinery operating cost per acre of gladiolus in southwest Florida

Item	Hours per acre		Cost per hour		Total cost per acre	
	Machinery	Labor	Machinery	Labor	Machinery	Labor
	No.	No.	Dollars	Dollars	Dollars	Dollars
Preharvest	20.7	60.3	3.00	2.28	62.16	137.48
Harvest	9.0	152.0	2.87	2.27	25.83	345.04
Postharvest	16.5	60.0	3.10	2.38	51.15	142.80
Total	46.2	272.3	--	--	139.14	625.32

ment. Bulb stocks are replaced at the annual rate of 20 percent. As shown, the investment per acre is $2,335 which, when amortized by Internal Revenue Service guidelines, amounts to an annual fixed cost of $324 with an annual operating cost of $203 per acre.

Labor and machinery coefficients and associated costs classified by seasonal operations are presented in Table 2. Not included in this table are the costs of materials and supplies. The preharvest costs are for all operations from land preparation to spike cutting. Harvest includes moving the flowers from the field, through the packing house and placing the hamper on the dock at the local distribution point. The postharvest operations begin with the final two sprayings for disease control through digging and moving the bulbs into cold storage.

A fertilizing, spraying and dipping program for a "typical" farm is itemized in Table 3. The

Table 3.--Fertilization, spraying and dipping program for gladiolus in southwest Florida

Item	Description of product used[a]	Times over	Unit	Quantity	Price per unit	Amount per acre
					Dollars	Dollars
Dolomite/lime	Dolomite, 1 ton/year	1	ton	1.0	9.00	9.00
Fertilizer	2,200 lbs. 6-8-9, 25% organic, bagged, delivered at $59/ton	4	cwt.	22.0	2.95	64.00
Nematicide	Dasinit, 10 lb. AI/A.	1	lb.	10.0	3.15	31.50
Herbicide	Lasso, 2 qts./ application	2	gal.	1.0	12.00	12.00
Insecticides	Cygon, 1 1/2 pt./A./appl.	4	pt.	6.0	1.98	11.88
	Lannate, 1/2 lb./A./appl.	4	lb.	2.0	9.00	18.00
	Sevin, 2 lb./50W/A./appl.	6	lb.	12.0	.56	6.72
Fungicide (flowers)	Manzate 200, 1 1/2 lb./A./appl.	14	lb.	21.0	.86	18.06
Spreader sticker	8 oz./100 gal.	14	qt.	3.5	.75	2.63
Fungicides (bulbs)						
pre-store	Benlate 50W, 1 1/2 lb./100 gal. H_2O, 1 wk. 397,800 bulbs in 450 gal. H_2O, 12 acres	1	lb.	.56	8.30	4.65
pre-plant	Dowicide B, 15 lb./planting in 500 gal. H_2O, 468,000 bulbs	1	lb.	1.25	.83	1.08
Total						$180.42

[a]The use of trade names is for clarification purposes and does not constitute an endorsement of any product.

Table 4.--Estimated costs for overhead and supervisory labor needed for a "typical" 325 acre gladiolus farm in southwest Florida

Job description	Main duties	Annual salary	Social Security[a]	Workmen's compensation[b]	Total annual compensation
		Dollars	Dollars	Dollars	Dollars
Assistant manager	Manage office, oversee bookkeeping, packing, sales	14,000	405.60	98.80	14,504.40
Secretary	Receptionist - typist - sales	5,200	270.40	98.80	5,569.20
Secretary-dispatcher	Billing sheets - sales - books	5,200	270.40	98.80	5,569.20
Field supervisor	Flower harvest, planting	7,800	405.60	107.64	8,313.24
Field supervisor	Bulb harvest, planting	7,800	405.60	107.64	8,313.24
Cold storage	Supervise cleaning - storage	7,800	405.60	107.64	8,313.24
Irrigation foreman	Irrigate - help grow	7,800	405.60	107.64	8,313.24
Total		--	--	--	58,895.76
General manager	Oversee entire operation - sales	17,000	405.60	107.64	17,513.24

[a]Calculated at 5.2 percent up to $7,800.

[b]Calculated at 2.07 percent up to $5,200 for outside employees and 1.9 percent for clerical personnel.

author acknowledges there are several ways that a program for accomplishing the operations noted may be carried out. The data presented in the table illustrates only one of these ways.

Determining the right number of overhead and/or supervisory employees needed to operate a 325 acre farm, because of the wide range of existing situations in Florida, is a most difficult task. However, based on a "typical" situation, the categories and job descriptions of the employees outlined in Table 4 tend to coincide with those on most gladiolus farms. The general manager's salary is not included in the totals presented in Table 3. The reason is that, if a management charge is assessed separately in the cost calculation format, one may take into consideration an owner-operator or a hired manager situation without having to recalculate to "break-out" a management charge.

The actual hourly wage rate an employer pays his workers is an important aspect of cost of production. Often a manager figures his wages per hour without taking into consideration fringe benefits or efficiency factors such as Social Security, workmen's compensation, vacation and down time due to unexpected repairs and inclement weather. These factors have been estimated under southwest Florida conditions (Table 5). Gladiolus growers have generally concurred that the efficiency factor is 75 percent for year-round employees and 80 percent for hourly laborers. The higher efficiency for hourly workers is based on the fact that these workers are not put to doing "odd jobs" as year-round employees are.

Labor hours required per acre and for the total 325 acre "typical" farm are shown in Table 6. The labor coefficients per acre for skilled and unskilled workers will be applicable to most farms. To determine the number of workers for a different size operation one can multiply acreage by hours required to arrive at the approximate number. Skilled workers consist of tractor drivers, truck drivers and forklift operators. The unskilled workers are the field laborers used for cutting spikes, cleaning bulbs, packing flowers and miscellaneous duties. Argument may be avoided as to the classification of skilled or unskilled by realizing that most field and packing house workers are paid on "piece rates" and therefore a workman will earn according to his skill and productivity.

Table 7 contains the summary of the study or, more accurately, an enterprise budget for growing gladiolus. An enterprise budget is a listing of the

Table 5.--Estimated wages and work efficiency of hourly workers on gladiolus farms in southwest Florida

Job	Hourly wage	Social Security	Workmen's compensation	Total hourly compensation	Efficiency factor[a]	Total effective compensation
	Dollars	Dollars	Dollars	Dollars	Percent	Dollars
Tractor driver	2.00	.104	.0414	2.1454	75	2.86
Truck driver	1.85	.0962	.0382	1.9844	75	2.65
Hourly laborer	1.65	.0858	.0341	1.7699	80	2.21

[a]Based on an estimate of vacation, down time and time lost due to inclement weather.

expected annual costs and returns from a particular farm enterprise. This budget is developed in four main categories: 1) gross receipts, the product of yield times price; 2) cash expenses, the out-of-pocket costs that must be covered or paid for in a given production period; 3) other expenses (these expenses may be experienced by some growers and not by others; however, they are still costs which must be borne or paid); and 4) fixed expenses, which includes the depreciation and interest on capital investment that can be allocated to a specific enterprise.

The main objective in arranging a budget in this manner is to make it useful to all growers regardless of farm size. If the budget has been constructed accurately, i.e., contains realistic coefficients, it can be utilized by a grower regardless of farm size. Depending on how a farm is organized, a grower can determine the applicability of the budget to his operation. The enterprise budget provides a useful format to the grower for changing any of the coefficients and inserting his own specific figures. For example, an owner-operator who does not rent land, borrow capital or hire management need only add his land taxes to his cash cost of 58 cents per dozen to arrive at his cash and other costs. However, a producer who has land rent, interest and management charges

Table 6.--Labor hours and man year equivalents, by months and type, required for a "typical" 325 acre gladiolus farm in southwest Florida

Month	Skilled labor			Unskilled labor		
	Hours per acre	Total hours	Men required[a]	Hours per acre	Total hours	Men required[b]
July	2.86	735	4	6.32	2,054	12
August	1.97	640	4	4.79	1,557	9
September	2.87	933	5	5.25	1,706	10
October	4.84	1,573	8	5.25	1,706	10
November	4.84	1,573	8	25.11	8,161	46
December	4.84	1,573	8	25.11	8,161	46
January	6.91	2,246	12	31.43	10,215	57
February	6.91	2,246	12	31.43	10,215	57
March	4.94	1,606	8	26.18	8,509	47
April	4.94	1,606	8	26.18	8,509	47
May	4.27	1,388	7	26.18	8,509	47
June	2.07	673	7	6.32	2,054	12

[a]Based on 200 man hours worked per month.

[b]Based on 180 man hours worked per month.

Table 7.--Enterprise budget for gladiolus costs and returns on a "typical" 325 acre farm in southwest Florida

Item	Description	Unit	Quantity	Price per unit	Amount per acre	Amount per doz.
				Dollars	Dollars	Dollars
Gross receipts	75% cut, 2,500 doz.					
Fancy grade	20%	doz.	500	1.15	575.00	
Special grade	20%	doz.	500	.95	475.00	
Standard grade	45%	doz.	1,125	.75	843.75	
Utility grade	15%	doz.	375	.50	187.50	
Total receipts					2,081.25	.83
Cash expenses						
Labor	a	hour	227.3		625.32	.25
Machinery	a	hour	46.2		139.14	.06
Maintenance & repairs						
Bldgs., equip.	$7,593[b]				23.36	.01
Irrigation	7,665[b]				23.58	.01
Bulb replacement	20%				156.00	.06
Fertilizer, insecticide	c				180.42	.07
Overhead labor	$58,895[d]				181.22	.07
Pickup travel	4 trucks	mile	48,000	.06	8.86	e
Office supplies	$800				2.46	e
Packing supplies	1/2 doz.				12.50	e
Shipping cartons	Avg. 20 doz./ctn.	ctn.	125	.60	75.00	.03
Telephone	25 calls/wk @ $2 for 7 mos. + 5 mos. @$200				30.77	.01
Misc. tools	Wrenches, sockets, chains @$500/yr.				1.54	e
Total cash expenses					1,460.17	.58
Return to land, operating capital, management, capital investment, ownership and risk					621.08	.25
Other expenses						
Land rent	$40 per acre	acre	325	40.00	40.00	.02
Interest on above expenses	On operating capital for 6 mos.	$	1,460.17	.0826	60.31	.02
Management chrg.	General manager[d]				53.89	.02
Total other expenses					154.20	.06
Total cash and other expenses					1,614.37	.64
Return to capital investment, ownership and risk					466.88	.19
Fixed expenses						
Machinery	$31,467[a]				96.82	.04
Buildings	41,177[a]				126.70	.05
Irrigation	20,939[a]				35.68	.01
Interest on bulbs	39,000 bulbs/acre @$20 M/ @ 8.26%				64.43	.03
Total fixed expenses					323.63	.13
Total cash, other and fixed expenses					1,938.00	.77
Return to ownership and risk					143.25	.06

[a]Data from Table 2.
[b]Data from Table 1.
[c]Data from Table 3.
[d]Data from Table 4.
[e]0.5 cent or less.

would have a total cash and other costs of 65 cents a dozen. In the former situation, the owner-operator who does not have funds tied up in land holdings will have a higher return to investment and ownership. Even though an input may be a cash expense to some growers and not others, it should be paid a return.

The fixed cost figure of 13 cents per dozen varies more between farms than other cost items. The annual charge for fixed costs is closely related to the value of physical facilities and sizes of operation. A more efficient operator may very well have costs of only half this amount. In any event, a 325 acre farm going into the gladiolus business today may expect cash costs to be 58 cents a dozen and fixed and other costs to be 20 cents a dozen, thereby making for a total cost of approximately 77 cents per dozen. With current prices, relatively good management and weather conditions which result in a 2,500 dozen per acre yield, a net return of 6 cents per dozen may be expected.

Summary

To enter into the production of gladiolus on a scale of the "average" grower in Florida, an initial investment of approximately $759,000 is necessary. Furthermore, to operate such a farm for the first year a credit line of at least $490,000 will be required. The required investment of $2,335 and cash costs of at least $1,500 per acre to realize a net return of $143 help explain why the number of gladiolus growers in Florida is declining.

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SHOOT-TIP CULTURE OF GLADIOLUS: AN EVALUATION OF NUTRIENT MEDIA FOR CALLUS TISSUE DEVELOPMENT

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Abstract

Explants from vegetative shoots of gladiolus (*G. grandiflorus*) 'Spic & Span' were cultured *in vitro* on 8 nutrient media, both liquid and solid. Liquid cultures were continuously agitated on a rotary shaker at 140 rpm. Shoot-tips grown on solid media either formed single plants (Hildebrandt medium), multiple plantlets (Murashige & Skoog medium), multiple plantlets and callus (Ziv, Halevy & Shilo medium), or failed to develop (White medium). Explants in liquid Ziv, Halevy & Shilo, or Murashige & Skoog, or Linsmaier & Skoog media developed callus within 4-5 weeks. Explants in the 5 remaining liquid nutrient media showed limited root and shoot growth but no callus development.

Introduction

Within the past twenty years plant tissue culture has made possible important advances in the fields of genetics, physiology, and pathology. It

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