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College of Agricultural and Environmental Sciences

An Evaluation of Direct and Indirect Economic Losses Incurred by Georgia Fruit and Vegetable Producers in Spring 2011

Prepared by:
John C. McKissick and Sharon P. Kane
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John C. McKissick and Sharon P. Kane

Distinguished Professor of Agricultural Marketing Emeritus and Public Service Associate

The University of Georgia Center for Agribusiness and Economic Development

Introduction

During the spring of 2011, numerous agricultural businesses in Georgia reported labor shortages. A survey conducted by the Georgia Department of Agriculture reported a shortage of more than 11,000 jobs during this time period. The situation appeared most acute in those perishable fresh fruit and vegetable crops just reaching harvest in spring to early summer. These crops are most dependent on timely seasonal harvest and packing labor in order to market perishable, high valued products. This report provides a summary and analysis of the magnitude and economic impact actually reported by producers of seven primary Georgia berry and vegetable crops. The Georgia Blueberry, Blackberry, Vidalia onion, Bell Pepper, Squash, Cucumber and Watermelon crops accounted for more than $578 million dollars of production value in 2009. This report summarizes a comprehensive survey conducted by the Georgia Fruit and Vegetable Growers Association (GFVGA) in the summer of 2011 to ascertain the magnitude and economic consequence actually experienced during the spring crop growing season. The authors utilize the data and provide analysis of the reported losses incurred directly by growers and the resulting impacts in the community and state as a result of the spring labor situation.

Survey Response

A survey instrument was developed by the GFVGA in consultation with major agricultural organizations, commodity leadership, and UGA Agricultural economists. The GFVGA survey was made available via electronic and hardcopy survey instrument to Georgia growers of the seven primary crops during August 2011. Follow up interviews were conducted for incomplete surveys by GFVGA staff. All raw data collected absent any respondent identification was provided to economists at the UGA Center for Agribusiness and Economic development for analysis and summary. As the following table shows, significant amounts of the total estimated acreage as reported in the UGA 2009 Farm Gate Value Report of the 7 crops were represented in the survey response. 189 respondents representing an aggregate of 31,311 acres of the 67,513 acres or 46.4% of the total Georgia production acreage completed and submitted surveys. Of the total responses, 41 of the respondents, representing 19.7% of the survey production acreage and 9.1% of Georgia's 2009 acreage, responded they did not experience harvest/packing labor shortages. 148 survey respondents reported they had experienced labor shortages, representing 80.3% of the survey production acreage and 37.3% of Georgia's 2009 acreage. It is apparent that a significant number of Georgia's spring Berry and Vegetable producers experienced labor shortages in the spring of 2011.

Table 1. Summary Survey Table with Estimated Acreage by Each Crop and Totals

		Total	No labor problem	Yes labor problem	Answered Labor Production Question
CROP		#/Acres/%	#/Acres/%	#/Acres/%	#/Acres/%
Blueberries	Survey Completed	92	27	65	54
	Total acres (2009)	16,346			
	Total Acres in survey	7,659	1950	5709	5192
	% of total acres in survey	46.9%	11.9%	34.9%	31.8%
Blackberry	Survey Completed	13	4	9	9
	Total acres (2009)	630			
	Total Acres in survey	502	120	382	382
	% of total acres in survey	79.7%	19.0%	60.6%	60.6%
Vidalia Onion	Survey Completed	18	*	*	15
	Total acres (2009)	12,993			
	Total Acres in survey	9,033	1985	7048	6223
	% of total acres in survey	69.5%	15.3%	54.2%	47.9%
Bell Pepper	Survey Completed	20	*	*	17
	Total acres (2009)*	5,130			
	Total Acres in survey	2,552	50	2502	2312
	% of total acres in survey	49.7%	1.0%	48.8%	45.1%
	Spr - 5,130 A				
	Fall - 3,420 A				
Squash	Survey Completed	14	*	*	10
	Total acres (2009)*	2,922			
	Total Acres in survey	1,515	190	1325	970
	% of total acres in survey	51.8%	6.5%	45.3%	33.2%
	Spr– 2,922 A				
	Fall – 1,948 A				
Cucumber	Survey Completed	12	0	12	9
	Total acres (2009)*	5,254			
	Total Acres in survey	2,510	0	2510	2100
	% of total acres in survey	47.8%	0.0%	47.8%	40.0%
	Spr– 5,254 A				
	Fall -3,502 A				
Watermelon	Survey Completed	20	6	14	12
	Total acres (2009)	24,238			
	Total Acres in survey	7,540	1860	5680	5645
	% of total acres in survey	31.1%	7.7%	23.4%	23.3%
GRAND TOTAL	Survey Completed	189	41	148	126
	Total acres (2009)	67,513			
	Total Acres in survey	31,311	6155	25156	22824
	Percent survey of total acres	46.4%	9.1%	37.3%	33.8%
	Percent of survey acres	100.00%	19.66%	80.34%	72.89%
	Percent of survey responses	100.00%	21.69%	78.31%	66.67%

*Undisclosed category due to 2 or fewer responses.

Economic Consequences

Utilizing the detailed historical and 2011 production and cost data supplied by the survey respondents, the authors calculated production losses or gains incurred by the survey respondents and those attributed to labor for the seven spring crops. Multiple questions allowed for consistency checks across the data as did the historical yield and price data. Loss calculations were derived from expected yield and price questions and compared to actual production realized from the acreage available for harvest. Questions pertaining to the amount of production unharvested or acreage that went unharvested allowed for calculated losses attributed directly harvest/packing labor shortfalls. In addition, the total number of harvester and/or packing jobs during peak harvest as compared to normal peak harvest employment allowed for calculation of total employment shortfalls. The following table summarizes the calculated losses by crop.

Table 2. Calculated Survey Loss Summary by Crop

	Calculated Production Losses Related to Labor Shortage -$-	Peak Harvest Labor Shortage Reported -# jobs-
Blueberries	-29,051,947	-1,932
Blackberries	-4,027,125	-300
Total for Berries	**-33,079,072**	**-2,232**
Watermelon	-2,592,230	-305
Cucumbers	-5,932,600	-806
Bell Peppers	-15,115,645	-948
Squash	-1,948,629	-118
Onions	-16,312,345	-835
Total for Vegetables	**-41,901,449**	**-3,012**
Overall Total	**-74,980,521**	**-5,244**

According to the information derived only from the survey respondents, producers who completed production or labor loss estimates directly attributable to harvest and packing labor shortages had a total calculated vegetable loss of $41.9 million and berry loss of $33.1 million for a total of $75 million in the seven spring crops. IF the survey respondents are representative of non-respondents, the total loss attributed to labor in the seven crops would be about $140 million based on loss per acre per crop as the total response represents 46.4 percentage of the total estimated crop acreage in the seven crops. The survey respondents reported a shortage of 5,244 workers at peak harvest season or 40.5 % of their normal peak harvest employment of 12,930 workers.

Economic Impact Analysis

Economic impacts can be estimated with models that separate the economy into various industrial sectors such as agriculture, construction, manufacturing, trade, and services. These models allow the study of a specific economy (i.e. county, region, state) as described by structure and function and examine the consequence of economic transactions on the entire system. The model calculates how a change in one industry changes output, income, or employment in other industries. These changes, or impacts, are expressed in terms of direct and indirect effects. Impacts are interpreted as the contribution of the enterprise to the total economy. Direct effects represent the initial impact on the economy of either construction or operations of an enterprise. Indirect effects are changes in other industries caused by direct effects of an enterprise and include changes in household spending due to changes in economic activity generated by direct effects. These household spending effected are also referred to as induced effects. Thus, the total economic impact is the sum of direct and indirect (a combination of indirect and induced) effects. Input-output analysis can interpret the effects of an enterprise in a number of ways including output (sales), labor income (employee compensation and proprietary income), employment (jobs), and tax revenue (Olson and Lindall 2004).

The IMPLAN model was chosen specifically for this analysis because of its widespread use and acceptability as a complete regional economic assessment system and because of the ability to select individual counties for creation of economic regions of interest (i.e. vegetable production counties). The IMPLAN system is widely used for predicting economic impacts by businesses and entities such as government agencies, college and universities, non-profit organizations, corporations, and business development and community planning organizations. The system includes both data and software and allows for flexible modeling in geography by the selection of custom analysis regions

Economic Impact on Georgia and Local Communities

Lost fruit and vegetable production in the state in 2011 resulted in losses not only to the producers involved but also to those who supply inputs to those producers. Further, losses were experienced by those who benefit indirectly from the expenditures that would have been created in the state and local communities had their not been labor shortages. A multi-county and state model of all the business and interactions of consumers and business was formulated to estimate the impacts of the reported losses for the seven spring crops in Georgia. The model was formulated utilizing appropriate components of IMPLAN combined with results from the GFVGA survey. Tables 3, 4, and 6 summarize the economic impact model results. Tables 7 to 30 provide more summary of the various models by major economic sector.

Results summarized in Table 3 indicated that on an annual basis the $41.9 million in lost vegetable production due to labor shortages resulted in another $56.1 million dollars lost in other goods and services in Georgia's economy for a total economic impact of about $98 million. The total of $33.1 million in berry production lost due to inadequate labor resulted in another $50.4 million for a total impact of $83.5 million. The total Georgia vegetable and berry economic impacts calculated from the

labor related lost production reported in the survey were estimated to be over $181 million less in total goods and services produced.

The so-called multiplier impacts occur as the money normally generated from the fruit and vegetable production was not spent on purchasing other goods and services. For instance, not only would the input suppliers suffer lost sales, but so would all the retail businesses that would have had customers from those employed by the fruit and vegetable producers and suppliers. The impacts reach further into the economy as the retailers then ultimately purchase less from others. On and on the impacts spin through the state and region's economy, resulting in fewer goods and services or state output produced in a multitude of industries and business not directly associated with fruit and vegetable production.

The lost output results in fewer jobs in producing not only the fruit and vegetables, but in those supplying other inputs that are no longer needed and the businesses selling products to the workers. The total job loss in a full time annual equivalent job basis was found to be 572 jobs lost directly in the production and another 940 in related businesses. Thus, the total impact resulting from the labor related lost production as reported from the survey respondents would be the loss of 1,512 full time jobs in Georgia per year. These results should be interpreted to mean that over a full production year, the impacts of the reported lost production in the survey would have the calculated impacts on Georgia's economy.

Table 3. Estimated Full Year Economic Impacts of Lost Labor Related Berry and Vegetable Production, Survey Response Only, Spring 2011

Impact and Area	Value of Output per Year($)			Full time Jobs Per Year (#)		
	Direct	Indirect/Induced	Total	Direct	Indirect/Induced	Total
Berries Statewide	-$33,079,072	-$50,425,012	-$83,504,084	-270	-452	-722
Vegetables Statewide	-$41,901,449	-$56,099,859	-$98,001,308	-302	-488	-790
Total Berry & Veg Statewide	-$74,980,521	-$106,524,871	-$181,505,392	-572	-940	-1,512
Berry Production Counties	-$33,079,072	-$34,802,037	-$67,881,109	-243.3	-374.9	-618
Vegetable Prod. Counties	-$41,901,449	-$35,502,846	-$77,404,295	-284.4	-379.4	-664
Total Berry &Veg Prod. Area	-$74,980,521	-$70,304,883	-$145,285,404	-528	-754	-1,282

Berry counties SE Ga., 4 Vegetable Crops SW Ga. Plus Onions SE Ga. = Veg. County Area
Lost Production Related to Labor, GFVGA Survey of 7 Spring Fruit and Vegetable Crops

The multiplier impacts are also keenly felt on the local level. The production counties for all the vegetables crops, with the exception of onions, are in the Southwest counties of the state. Berry and Onion production are in the Southeast part of the state. In order to illustrate the impacts on the local counties of production, regional models of Southwest and Southeast Georgia counties were estimated to illustrate the community impacts. As can be seen from Table 3, the local communities suffer most of the impact with all the direct impact occurring locally and with an additional $70.3 million occurring in indirect effects for a total community impact of over $145 million. In full time annual equivalent job units, the direct impact to the local community is a reduction of 528 full time jobs per year. An additional 754 in related jobs are lost due to reduced output and thus fewer jobs generated. The total impact in job loss is found to be about 1,282 fewer jobs in the local production area as a result of the lost output reported by producers in spring 2011 due to the labor situation. Tables 7 to 14 provide more detailed results by major economic sector.

The estimates in all the impact tables are based only on the results found directly from the survey. IF the survey were representative of all of Georgia's seven crop's acreage studied, then the results from the impact analysis could be scaled to reflect the overall impact of the approximately 53.6% of Georgia acreage not accounted for in the survey. The impact tables show that for each $1 million lost in berry production there is an additional $1.4 million of lost output and about 20 lost jobs. Each $1 million in vegetables results in an additional indirect impact of $1.34 million and the loss of about 19 total full time jobs. For example, IF the survey results were representative of all acreage, the total yearly impact would be about $391 million and the job loss would be about 3,260 on a statewide basis. However, no data exist to determine how representative the surveyed acreage is of the total acreage. The survey does represent a detailed analysis of a very large percentage of the seven berry and vegetable crops.

Since the labor shortage became apparent to producers after production plans and pre harvest inputs were purchased and used, a second model was estimated to account for the total impacts of the post-harvest/packing inputs alone. The lost output reported from the survey was reduced by the ratio of pre harvest to post harvest expenses and resulted in a total economic impact of -$103.6 million on a state level with -$83.2 million occurring in the local production communities (Table 4). Job losses were calculated at 869 full time jobs on the state level with a loss of 739 full time jobs occurring at the local level. This model can be interpreted to represent an approximation of the economic impacts occurring in the partial production year of 2011 as production inputs were purchased in anticipation of a complete harvest. The growers experienced a reported loss from inadequate harvest and packing labor of $75 million in spring 2011 in the seven crops, but the total economic impacts were mitigated as inputs were purchased for a full harvest. However, if the results are repeated in following full years, the impacts of the full production year model would be felt.

Table 4.Estimated Partial Production Year Economic Impacts of Lost Labor Related Berry and Vegetable Production, Survey Response Only Spring 2011

Impact and Area	Partial Year Value of Output($)			Full time Jobs Per Year (#)		
	Direct Impact Net of Pre-Harvest Inputs	Indirect/ Induced Impacts	Total	Direct	Indirect/ Induced	Total
Berries Statewide	-$22,861,808	-$34,850,038	-$57,711,846	-187	-312	-499
Vegetables Statewide	-$19,625,942	-$26,276,243	-$45,902,185	-142	-228	-370
Total Berry & Veg Statewide	-$42,487,750	-$61,126,281	-$103,614,031	-328	-541	-869
Berry Production Counties	-$22,861,808	-$24,052,595	-$46,914,403	-168.2	-259.1	-427
Vegetable Prod. Counties	-$19,625,942	-$16,663,650	-$36,289,593	-133.6	-177.9	-312
Total Berry &Veg Prod. Area	-$42,487,750	-$40,716,245	-$83,203,996	-302	-437	-739

Berry counties SE Ga., 4 Vegetable Crops SW Ga. Plus Onions SE Ga. = Veg. County Area
Partial Year Output assumed from the reported Labor Related Production Loss Adjusted by Crops Pre Harvest to Post Harvest Expense Ratio

In an effort to determine what the longer term or full year impacts may be, the survey asked how producer's 2012 production might be impacted by the labor situation experienced in 2011. The table below shows that while most respondents to the question indicated they would try to maintain production, a significant number of vegetable producers planned cuts. Yearly planted annual crops such as vegetables can more easily be altered than can perennial, multi-year crops such as those produced from berry bushes. However, even berry producers indicated planned changes in production

and harvest/packing methods if the labor experience of 2011 is repeated in 2012. Tables 15 to 22 show the detailed impacts experienced by major economic sectors as estimated from the partial year model for both Georgia and the production region.

Table 5. Summary of 2012 Intentions by Crop

CROP	Total Number Reporting Labor Problems	Response to Q	Plans for spring 2012 – Acres			Avg % decrease
			Increase	Maintain	Decrease	
Blueberries	65	36	6	26	4	35%
Blackberries	9	5	0	1	4	57%
Total Berries	74	41	6	27	8	47%
Percent of Berry Growers Reporting Labor Problem		55%	15%	65%	20%	
Bell Pepper	19	13	1	7	5	55%
Cucumbers	12	8	0	4	4	35%
Squash	12	8	0	5	3	30%
Vidalia Onions	17	13	0	5	8	40%
Watermelons	14	5	0	0	5	35%
Total Vegetables	148	47	1	21	25	39%
Percent of Vegetable Growers who Reported Labor Problem		72%	2%	45%	53%	
Total Berry and Veg.		88	7	48	33	
Percent			8%	54.5%	37.5%	

Georgia berry and vegetable producers reported a total of 5,244 peak harvest jobs that were unfilled in 2011 as compared to 2010. Thus the state's economy and the local communities did not have the portion of the labor income that would have been earned and spent flowing through the economy. Goods and services that normally would have been purchased locally had the needed labor been employed, were not. The associated businesses and jobs required to provide the goods and services in Georgia would have been impacted; assuming the labor were not employed elsewhere in the state during this time. Large job employing plant closures in local communities and their impact on everything from housing, food, and clothing and the stores providing them are impacted in a similar way as the loss of jobs spread among many business in a local area. Since such job loss is apparent to the local community even if not in the larger economy, a model was developed using only the lost jobs reported by producers in the survey. While these jobs are included in the overall impacts above, a different light may be shed on the total local and state economic impacts by focusing solely on the impacts of the reported lost jobs and wages that would have been earned and spent in the economy. In order to properly account for the impacts, peak harvest and packing jobs were assumed to be employed about 2 months on average in the local area meaning the total 5,244 job shortage reported by surveyed berry and vegetable producers would covert to 874 full time job equivalents. The direct, indirect and induced impacts were then calculated from the economic impact model for both the state and production area's economy. Table 6 summarizes the results on output of goods, services and jobs lost due solely to the lost wages. Since the harvesting and packing labor was not employed and wages not earned, the entire input is lost to the area and impacts can be correctly interpreted as either the 2011

results or any following year in which the same job shortage occurs. Tables 23 to 30 show the estimated impacts by major economic sectors.

Table 6. Estimated Labor Reduction Economic Impacts, Survey Response Only Spring 2011

Impact and Area	Value of Output per Year($)			Full time Jobs Per Year (#)		
	Direct	Indirect/Induced	Total	Direct	Indirect/Induced	Total
Berries Statewide	-$10,694,899	-$10,996,044	-$21,690,943	-372	-88	-460
Vegetables Statewide	-$14,432,364	-$14,808,900	-$29,241,264	-502	-118	-620
Total Berry & Veg Statewide	-$25,127,263	-$25,804,944	-$50,932,207	-874	-206	-1,080
Berry Production Counties	-$9,213,674	-$5,732,890	-$14,946,564	-372	-52.7	-425
Vegetable Prod. Counties	-$14,375,214	-$8,090,827	-$22,466,041	-502	-79.7	-582
Total Berry &Veg Prod. Area	-$23,588,888	-$13,823,717	-$37,412,605	-874	-132	-1,006

Berry counties SE Ga., 4 Vegetable Crops SW Ga. Plus Onions SE Ga. = Veg. County Area
Reported Peak Labor Shortage Converted to FTE assuming 8 weeks employment.

Summary

During the spring of 2011, Georgia berry and vegetable producers experienced a labor shortfall of more than 5,000 workers during peak harvest and packaging season. According to a survey conducted by GFVGA representing about half of all the production acreage in seven berry and vegetable crops, a total of $75 million in production was lost by 189 producers due to harvest and packaging labor shortages. An economic impact model indicates that the lost fruit and vegetable production led to an estimated $103.6 million reduction in total goods and services produced on a state wide basis during 2011 and about 870 full time jobs. If the labor shortage of 2011 were repeated for a full year, a total of $181.5 million in lost production and 1,512 full time equivalent jobs could be forecast. The survey suggests that based on the 2011 job experience, producers plan to cut production of vegetables and/or change harvesting methods with resulting loss in production value if the labor shortage of 2011 is expected to reoccur. Local communities felt all of the direct impact of lost jobs and fruit/vegetable production due to the labor shortage as well two-thirds of the spin-off business and job impacts occurring in the entire state's economy. If the GFVGA survey were representative of all the remaining acreage in the seven crops, the lost production and economic impacts would be a little over double those found directly from the survey response. The economic consequence of the spring 2011 Georgia berry and vegetable harvest/packing labor shortage will have obvious consequences to both the sustainability and/or growth potential of the half billion dollar berry and vegetable industry as well as the local communities that host the majority of the production area.

Detailed Economic Impact Tables

Table 7. Full Production Year Output Impact - Berry Production, Statewide

Description	Direct	Indirect	Induced	Total
Total	-33,079,072	-9,691,784	-40,733,228	-83,504,084
Agriculture	-33,079,072	-1,872,691	-140,486	-35,092,249
Mining	0	-10,366	-8,276	-18,642
Construction	0	-142,595	-339,926	-482,521
Manufacturing	0	-1,692,615	-1,708,439	-3,401,054
TIPU*	0	-1,377,307	-1,996,159	-3,373,466
Trade	0	-861,675	-5,714,445	-6,576,120
Service	0	-3,456,019	-30,119,998	-33,576,017
Government	0	-278,514	-705,500	-984,014

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 8. Full Production Year Employment Impact - Berry Production, Statewide

Description	Direct	Indirect	Induced	Total
Total	-270.2	-101.7	-350.3	-722.2
Agriculture	-270.2	-60.9	-1.2	-332.3
Mining	0.0	0.0	0.0	-0.1
Construction	0.0	-1.6	-3.6	-5.1
Manufacturing	0.0	-3.6	-4.5	-8.1
TIPU*	0.0	-6.5	-9.5	-16.0
Trade	0.0	-4.6	-78.2	-82.8
Service	0.0	-23.3	-249.1	-272.4
Government	0.0	-1.3	-4.2	-5.5

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 9. Full Production Year Output Impact - Vegetable Production, Statewide

Description	Direct	Indirect	Induced	Total
Total	-41,901,449	-17,087,282	-39,012,577	-98,001,307
Agriculture	-41,901,449	-2,187,111	-96,247	-44,184,806
Mining	0	-25,890	-7,919	-33,809
Construction	0	-252,102	-325,063	-577,165
Manufacturing	0	-2,867,237	-1,643,300	-4,510,537
TIPU*	0	-2,298,306	-1,915,776	-4,214,081
Trade	0	-1,671,451	-5,478,015	-7,149,466
Service	0	-7,355,162	-28,868,673	-36,223,835
Government	0	-430,022	-677,585	-1,107,607

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 10. Full Production Year Employment Impact - Vegetable Production, Statewide

Description	Direct	Indirect	Induced	Total
Total	-302.1	-152.4	-335.3	-789.8
Agriculture	-302.1	-70.2	-0.8	-373.1
Mining	0.0	-0.1	0.0	-0.1
Construction	0.0	-2.7	-3.4	-6.2
Manufacturing	0.0	-5.9	-4.3	-10.2
TIPU*	0.0	-10.9	-9.1	-20.0
Trade	0.0	-9.0	-74.8	-83.8
Service	0.0	-51.6	-238.7	-290.2
Government	0.0	-2.0	-4.1	-6.1

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 11. Full Production Year Output Impact - Berry Production, Berry Production Counties

Description	Direct	Indirect	Induced	Total
Total	-33,079,072	-6,927,503	-27,874,534	-67,881,109
Agriculture	-33,079,072	-1,828,840	-113,740	-35,021,652
Mining	0	-6,092	-7,215	-13,307
Construction	0	-111,710	-262,139	-373,848
Manufacturing	0	-1,052,167	-827,650	-1,879,817
TIPU*	0	-1,174,161	-1,426,301	-2,600,462
Trade	0	-503,036	-4,263,102	-4,766,139
Service	0	-1,968,430	-20,266,969	-22,235,399
Government	0	-283,068	-707,418	-990,485

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 12. Full Production Year Employment Impact - Berry Production, Berry Production Counties

Description	Direct	Indirect	Induced	Total
Total	-243.3	-95.9	-279.0	-618.2
Agriculture	-243.3	-67.3	-1.1	-311.7
Mining	0.0	0.0	0.0	-0.1
Construction	0.0	-1.3	-2.9	-4.2
Manufacturing	0.0	-1.6	-1.9	-3.5
TIPU*	0.0	-6.1	-8.0	-14.1
Trade	0.0	-3.6	-68.4	-72.0
Service	0.0	-14.7	-192.5	-207.2
Government	0.0	-1.3	-4.2	-5.5

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 13. Full Production Year Output Impact - Vegetable Production, Vegetable Production Counties

Description	Direct	Indirect	Induced	Total
Total	-41,901,449	-10,804,451	-24,698,395	-77,404,295
Agriculture	-41,901,449	-2,138,941	-82,547	-44,122,937
Mining	0	-11,277	-6,076	-17,352
Construction	0	-164,757	-211,108	-375,865
Manufacturing	0	-1,844,455	-697,983	-2,542,438
TIPU*	0	-1,632,738	-1,066,255	-2,698,993
Trade	0	-983,034	-3,958,955	-4,941,989
Service	0	-3,524,465	-17,992,062	-21,516,526
Government	0	-504,785	-683,409	-1,188,194

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 14. Full Production Year Employment Impact - Vegetable Production, Veg. Production Counties

Description	Direct	Indirect	Induced	Total
Total	-284.3	-122.2	-257.2	-663.7
Agriculture	-284.3	-69.8	-0.8	-354.9
Mining	0.0	0.0	0.0	-0.1
Construction	0.0	-1.9	-2.4	-4.3
Manufacturing	0.0	-4.0	-1.8	-5.8
TIPU*	0.0	-9.7	-6.7	-16.4
Trade	0.0	-7.4	-65.4	-72.8
Service	0.0	-27.2	-176.2	-203.5
Government	0.0	-2.2	-3.8	-6.1

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 15. Partial Production Year Output Impact - Berry Production, Statewide

Description	Direct	Indirect	Induced	Total
Total	-22,861,808	-6,698,244	-28,151,794	-57,711,846
Agriculture	-22,861,808	-1,294,266	-97,093	-24,253,167
Mining	0	-7,165	-5,720	-12,884
Construction	0	-98,551	-234,932	-333,483
Manufacturing	0	-1,169,810	-1,180,746	-2,350,557
TIPU*	0	-951,893	-1,379,597	-2,331,490
Trade	0	-595,526	-3,949,401	-4,544,928
Service	0	-2,388,545	-20,816,715	-23,205,259
Government	0	-192,488	-487,589	-680,078

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 16. Partial Production Year Employment Impact - Berry Production, Statewide

Description	Direct	Indirect	Induced	Total
Total	-186.8	-70.3	-242.1	-499.2
Agriculture	-186.8	-42.1	-0.8	-229.7
Mining	0.0	0.0	0.0	0.0
Construction	0.0	-1.1	-2.5	-3.5
Manufacturing	0.0	-2.5	-3.1	-5.6
TIPU*	0.0	-4.5	-6.6	-11.1
Trade	0.0	-3.2	-54.1	-57.2
Service	0.0	-16.1	-172.1	-188.2
Government	0.0	-0.9	-2.9	-3.8

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 17. Partial Production Year Output Impact - Vegetable Production, Statewide

Description	Direct	Indirect	Induced	Total
Total	-19,625,942	-8,003,399	-18,272,844	-45,902,184
Agriculture	-19,625,942	-1,024,407	-45,081	-20,695,429
Mining	0	-12,126	-3,709	-15,836
Construction	0	-118,081	-152,254	-270,335
Manufacturing	0	-1,342,966	-769,694	-2,112,661
TIPU*	0	-1,076,488	-897,317	-1,973,806
Trade	0	-782,880	-2,565,811	-3,348,691
Service	0	-3,445,036	-13,521,607	-16,966,643
Government	0	-201,415	-317,369	-518,785

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 18. Partial Production Year Employment Impact – Vegetable Production, Statewide

Description	Direct	Indirect	Induced	Total
Total	-141.5	-71.4	-157.0	-369.9
Agriculture	-141.5	-32.9	-0.4	-174.8
Mining	0.0	0.0	0.0	-0.1
Construction	0.0	-1.3	-1.6	-2.9
Manufacturing	0.0	-2.8	-2.0	-4.8
TIPU*	0.0	-5.1	-4.3	-9.4
Trade	0.0	-4.2	-35.0	-39.2
Service	0.0	-24.1	-111.8	-135.9
Government	0.0	-0.9	-1.9	-2.8

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 19. Partial Production Year Output Impact - Berry Production, Berry Production Counties

Description	Direct	Indirect	Induced	Total
Total	-22,861,808	-4,787,778	-19,264,817	-46,914,403
Agriculture	-22,861,808	-1,263,959	-78,609	-24,204,375
Mining	0	-4,210	-4,987	-9,197
Construction	0	-77,205	-181,171	-258,376
Manufacturing	0	-727,180	-572,011	-1,299,190
TIPU*	0	-811,494	-985,754	-1,797,247
Trade	0	-347,662	-2,946,341	-3,294,003
Service	0	-1,360,433	-14,007,030	-15,367,464
Government	0	-195,635	-488,915	-684,550

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 20. Partial Production Year Employment Impact - Berry Production, Berry Production Counties

Description	Direct	Indirect	Induced	Total
Total	-168.2	-66.3	-192.8	-427.3
Agriculture	-168.2	-46.5	-0.8	-215.4
Mining	0.0	0.0	0.0	0.0
Construction	0.0	-0.9	-2.0	-2.9
Manufacturing	0.0	-1.1	-1.3	-2.4
TIPU*	0.0	-4.2	-5.5	-9.8
Trade	0.0	-2.5	-47.3	-49.7
Service	0.0	-10.2	-133.0	-143.2
Government	0.0	-0.9	-2.9	-3.8

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 21. Partial Production Year Output Impact - Vegetable Production, Veg. Production Counties

Description	Direct	Indirect	Induced	Total
Total	-19,625,943	-5,070,781	-11,592,868	-36,289,593
Agriculture	-19,625,943	-1,001,903	-38,136	-20,665,983
Mining	0	-5,324	-2,859	-8,182
Construction	0	-77,675	-99,551	-177,226
Manufacturing	0	-864,930	-328,431	-1,193,361
TIPU*	0	-771,071	-504,877	-1,275,948
Trade	0	-460,500	-1,854,347	-2,314,847
Service	0	-1,654,157	-8,445,083	-10,099,240
Government	0	-235,221	-319,584	-554,805

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 22. Partial Production Year Employment Impact – Veg. Production, Veg. Production Counties

Description	Direct	Indirect	Induced	Total
Total	-133.6	-57.4	-120.5	-311.5
Agriculture	-133.6	-32.8	-0.4	-166.8
Mining	0.0	0.0	0.0	0.0
Construction	0.0	-0.9	-1.1	-2.0
Manufacturing	0.0	-1.9	-0.9	-2.7
TIPU*	0.0	-4.5	-3.2	-7.7
Trade	0.0	-3.5	-30.6	-34.0
Service	0.0	-12.8	-82.6	-95.4
Government	0.0	-1.0	-1.8	-2.8

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 23. Estimated Labor Reduction Output Impacts, Berry Survey Response, Statewide

Description	Direct	Indirect	Induced	Total
Total	-10,694,899	-1,648,274	-9,347,770	-21,690,943
Agriculture	-10,694,899	-61,243	-33,852	-10,789,994
Mining	0	-1,223	-1,916	-3,139
Construction	0	-11,682	-76,290	-87,972
Manufacturing	0	-576,149	-410,007	-986,155
TIPU*	0	-164,090	-466,413	-630,503
Trade	0	-258,371	-1,309,102	-1,567,472
Service	0	-559,816	-6,885,020	-7,444,836
Government	0	-15,701	-165,171	-180,871

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 24. Estimated Labor Reduction Employment Impacts, Berry Survey Response, Statewide

Description	Direct	Indirect	Induced	Total
Total	-372.0	-8.3	-79.6	-459.9
Agriculture	-372.0	-1.0	-0.3	-373.3
Mining	0.0	0.0	0.0	0.0
Construction	0.0	-0.1	-0.8	-0.9
Manufacturing	0.0	-0.5	-1.1	-1.6
TIPU*	0.0	-0.8	-2.2	-3.0
Trade	0.0	-1.3	-17.5	-18.8
Service	0.0	-4.5	-56.7	-61.2
Government	0.0	-0.1	-1.0	-1.1

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 25. Estimated Labor Reduction Output Impacts, Vegetable Survey Response, Statewide

Description	Direct	Indirect	Induced	Total
Total	-14,432,364	-2,224,271	-12,584,629	-29,241,264
Agriculture	-14,432,364	-82,637	-32,100	-14,547,101
Mining	0	-1,651	-2,575	-4,225
Construction	0	-15,764	-102,775	-118,539
Manufacturing	0	-777,490	-551,888	-1,329,378
TIPU*	0	-221,433	-628,110	-849,543
Trade	0	-348,661	-1,764,441	-2,113,103
Service	0	-755,447	-9,280,182	-10,035,629
Government	0	-21,188	-222,557	-243,745

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 26. Estimated Labor Reduction Employment Impacts, Vegetable Survey Response, Statewide

Description	Direct	Indirect	Induced	Total
Total	-502.0	-11.2	-107.2	-620.3
Agriculture	-502.0	-1.3	-0.3	-503.6
Mining	0.0	0.0	0.0	0.0
Construction	0.0	-0.2	-1.1	-1.3
Manufacturing	0.0	-0.7	-1.4	-2.1
TIPU*	0.0	-1.1	-2.9	-4.0
Trade	0.0	-1.8	-23.6	-25.4
Service	0.0	-6.0	-76.5	-82.5
Government	0.0	-0.1	-1.3	-1.5

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 27. Estimated Labor Reduction Output Impacts, Berry Survey Response, Berry Prod. Counties

Description	Direct	Indirect	Induced	Total
Total	-9,213,674	-941,811	-4,791,079	-14,946,565
Agriculture	-9,213,674	-34,480	-20,398	-9,268,552
Mining	0	-1,137	-1,252	-2,389
Construction	0	-7,781	-44,098	-51,879
Manufacturing	0	-387,007	-147,458	-534,464
TIPU*	0	-108,461	-251,543	-360,004
Trade	0	-148,420	-723,129	-871,549
Service	0	-243,123	-3,478,721	-3,721,844
Government	0	-11,403	-124,480	-135,883

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 28. Estimated Labor Reduction Employment Impacts, Berry Survey Response, Berry Production Counties

Description	Direct	Indirect	Induced	Total
Total	-372.0	-8.3	-79.6	-459.9
Agriculture	-372.0	-1.0	-0.3	-373.3
Mining	0.0	0.0	0.0	0.0
Construction	0.0	-0.1	-0.8	-0.9
Manufacturing	0.0	-0.5	-1.1	-1.6
TIPU*	0.0	-0.8	-2.2	-3.0
Trade	0.0	-1.3	-17.5	-18.8
Service	0.0	-4.5	-56.7	-61.2
Government	0.0	-0.1	-1.0	-1.1

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 29. Estimated Labor Reduction Output Impacts, Veg.Survey Response, Veg. Production Counties

Description	Direct	Indirect	Induced	Total
Total	-14,375,214	-1,129,405	-6,961,422	-22,466,041
Agriculture	-14,375,214	-69,341	-25,866	-14,470,420
Mining	0	-685	-1,731	-2,415
Construction	0	-8,322	-56,672	-64,994
Manufacturing	0	-402,197	-202,777	-604,974
TIPU*	0	-103,916	-292,531	-396,446
Trade	0	-201,343	-1,112,320	-1,313,663
Service	0	-329,806	-5,067,325	-5,397,132
Government	0	-13,795	-202,201	-215,996

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.
*Transportation, Information and Public Utilities

Table 30. Estimated Labor Reduction Employment Impacts, Veg. Survey Response, Veg. Prod. Counties

Description	Direct	Indirect	Induced	Total
Total	-502.0	-7.0	-72.7	-581.7
Agriculture	-502.0	-1.1	-0.2	-503.3
Mining	0.0	0.0	0.0	0.0
Construction	0.0	-0.1	-0.6	-0.7
Manufacturing	0.0	-0.3	-0.5	-0.9
TIPU*	0.0	-0.7	-1.9	-2.5
Trade	0.0	-1.4	-18.3	-19.7
Service	0.0	-3.4	-50.0	-53.3
Government	0.0	-0.1	-1.1	-1.2

Source: Data and Software, Minnesota IMPLAN Group, Inc. Analysis: UGA Center for Agribusiness and Economic Development.*Transportation, Information and Public Utilities

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Olson, D. and S. Lindall (2004). IMPLAN Professional Software, Analysis, and Data Guide. 1725 Tower Drive west, Suite 140, Stillwater, MN 55082, www.implan.com, Minnesota IMPLAN Group, Inc.

The Center for Agribusiness & Economic Development

The Center for Agribusiness and Economic Development is a unit of the College of Agricultural and Environmental Sciences of the University of Georgia, combining the missions of research and extension. The Center has among its objectives:

> To provide feasibility and other short term studies for current or potential Georgia agribusiness firms and/or emerging food and fiber industries.
>
> To provide agricultural, natural resource, and demographic data for private and public decision makers.

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Or contact:

Kent L. Wolfe, Director
Center for Agribusiness and Economic Development
Lumpkin House
The University of Georgia
Athens, Georgia 30602-7509
Phone (706)542-2434

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J. Scott Angle, Dean and Director