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Econ WP-64

**AGRICULTURAL DEVELOPMENT SYSTEMS
EGYPT PROJECT**

UNIVERSITY OF CALIFORNIA, DAVIS

**ECONOMIC ASPECTS AND ESTIMATION OF POST HARVEST
LOSSES IN SOME HORTICULTURE CROPS**

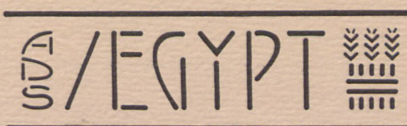
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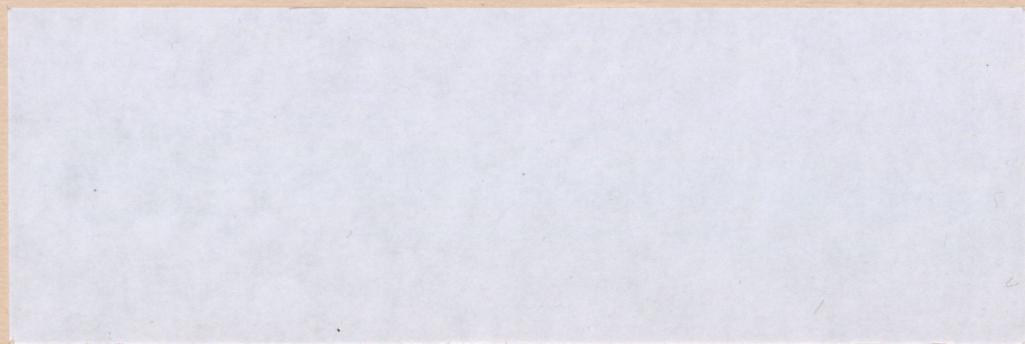
**Nabil T. Habashy
Ministry of Agriculture**

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By

**Nabil T. Habashy
Ministry of Agriculture**

Assistance from the Agricultural Development Systems Project of the University of California, Egyptian Ministry of Agriculture, and USAID, is gratefully acknowledged, but the author is solely responsible for the views expressed in this paper.

**Economics
Working Paper Series
No. 64**

Note: The Research Reports of the Agricultural Development Systems: Egypt Project, University of California, Davis, are preliminary materials circulated to invite discussion and critical comment. These papers may be freely circulated but to protect their tentative character, they are not to be quoted without the permission of the author(s).

March, 1982

**Agricultural Development Systems:
Egypt Project
University of California
Davis, Ca 95616**

Economic Aspects and Estimation of Post Harvest
Losses in Some Horticulture Crops

By

Nabil T. Habashy*

Post harvest losses are a complex problem, with technological, infrastructural, economic, and socio economic dimensions. Thus, solution of the loss problem requires a multi-disciplinary approach. Introducing new marketing facilities, equipment, and improved handling systems can contribute to reducing these losses. However, suggested modifications or improvements in the handling system should be related to the stage of economic development in the country. In a developing country, the introduction of sophisticated facilities will be meaningless if not related to the local know how. Technical or demonstration trials can provide information for benefit/cost analysis and other measures of project evaluation. Capital or labor intensive projects should be selected according to the employment status in the country.

The economic system prevailing in the country will be reflected in the organization of the marketing system. Any improvement or introduction of new marketing facility is subject to that system. Prices which play a significant role in investment decisions for marketing facilities in a free market economy, may not play the same role in a directed or restricted economy. The relationship between the public and private sector in a directed economy, pricing policies, regulations prevailing, and market information will affect any investment decision for loss reducing marketing facilities. Note that price policies may act as disincentives for investment decisions. The administrative set-up and the legal status of the public sector are also important factors.

*Head of Marketing Studies, Agricultural Economics Institute, Ministry of Agriculture, Cairo Egypt. The author appreciates the comments of Hoy Carman and Jerry Foytik on an earlier draft of this paper.

Investment policy priorities in a directed economy will affect any strategy for developing marketing facilities. In Egypt, marketing projects and improvements in the handling system have a lower priority than agricultural production. Investments devoted to marketing facilities such as packing and storage are inadequate. Grading is done only for the export crops or for selected horticultural crops such as potatoes in some relatively high income regions. Storage facilities are insufficient, expensive, and in some cases, misallocated between producing and consuming regions. The result is a high percentage of losses in some crops. Storing potato seeds in Nowlout for example, results in approximately 20 percent losses with respect to the quantity stored.

The limited financial capacity of small fruit and vegetable producers and middlemen affects their ability to establish or to use efficient marketing facilities. Schemes that vertically coordinate agricultural production, processing, and marketing are very limited in Egypt. The cooperative system for vegetables and fruits could be more effective in reducing losses if it increased procurement of products from small producers, and increased its bargaining power. Cooperatives must convince the growers of the importance of the system in obtaining better prices, and provide them with efficient marketing facilities to reduce post harvest losses of their perishable products. The above considerations should be treated as one package. Investment and credit policy are not separated from price policy and both are related to market structure. Market imperfections, lack of coordination, and lack of information between producing, processing, marketing and exporting firms contributes to increased losses. These issues represent the supply side, but the demand side also affects losses. Consumer preferences and attitudes, as well as social and socio-economic factors must be considered in the modification, improvement, or establishment of marketing facilities.

Per capita income, price elasticities and income elasticities of needed marketing services have to be considered in any modification to improve the handling system. Consequently the size of loss would vary between different regions in the country according to the demand elasticity of the required services.

One of the objectives of this paper is to throw light on the size of post harvest losses in physical and value terms for three horticultural crops, potatoes, tomatoes, and grapes. Three levels in the marketing system are considered, the farm, wholesale, and retail levels. The main producing areas and marketing channels for the three crops are represented. The two major wholesale markets in Egypt, Rod El Farag in Cairo and El Nozha in Alexandria, have been investigated. Retail markets in Cairo and Alexandria which seem to represent different income classes and different marketing channels were also selected. However, criteria for selection of retail markets representing different income classes was subjective. The horticulture activity of the Egypt/California project has estimated post harvest losses for different crops according to technical criteria. However, the estimation here is based on the response of interviewees to a questionnaire. The paper also shows some indicators of loss at export market and the basis needed for estimation.

Estimation of Post Harvest Losses

A. Losses at the Farm Level

Losses at the farm level are mainly caused by inadequate means of harvesting or by delays in moving the harvested product to market.

1. Potatoes:

The loss of potatoes at the farm level for all regions investigated was estimated at 5.21 percent of total production. However, this ratio differed between villages. It was 4.4 percent, 6.0 percent, 7.3 percent, and 2.1 percent in villages V₁, V₂, V₃, and V₄, respectively. The percentage of loss appears to be directly related with the percentage of the crop which is exported. There is very little sorting of potatoes destined for domestic use. The quantities exported accounted for 45 percent, 72 percent, 87 percent, and 0 percent of total production in villages V₁, V₂, V₃, and V₄, respectively. The number of sample farmers who devote their production to export were 16.6 percent, 73 percent, 93 percent, and 0 percent for villages V₁, V₂, V₃, and V₄, respectively. Growers who produce for the export market tend to receive higher farm level prices. However, in the first village net price* for exports is almost the same as prices received when marketing at the Cairo market, L.E. 74.7 and L.E. 73.5 per ton for Cairo and the export market, respectively. It should be noted that losses are a function of many variables and that quantitative analysis of relationships is needed. The number of skilled laborers who are picking the product, picking method, yield per feddan, average size of land holding, and the marketing period may affect losses at the farm level.

*See potato villages in the sample.

2. Tomatoes:

Losses were higher for tomatoes than for potatoes. The estimated farm level loss amounted to 8.1 percent, 9.8 percent, and 16.6 percent in villages V₁, V₂, and V₃, respectively. The percentage of losses appear to be related to the marketing channels utilized. Producers in villages 1 and 2 sell most of their production at the farm; village 1 does ship a small portion to the Cairo market. Village 3 producers market their tomatoes in Alexandria and perform more sorting at the farm level.

3. Grapes:

Farm level losses of grapes were 1.6 percent, 9.7 percent, and 4.2 percent for villages V₁, V₂, and V₃, respectively. It seems that there is a relation between variety cultivated and percentage of loss. Village 1 specializes in Romi, a variety which can bear handling in the field. Moreover, all of village 1 production is sold at the farm. In village 2 there were four marketing channels utilized and losses were high. In the third village 3 channels were utilized. Average price per ton was the lower in the village 1 than in villages 2 and 3. So variety, kind of marketing channel, method of selling in addition to picking method and other variables result at different percentages of losses in the three villages.

4. Losses in Potato Seed:

Storage of potato seeds has taken place in two villages, V₁, and V₂. Only 25 percent of the total number of sample farmers stored their seeds. However, in villages V₁ and V₂ 50 percent of the farmers have stored potato seeds. In these villages 28 percent store in Nowlat and 21 percent utilize refrigerated storage. Overall loss whole in storage was estimated at 15.0 percent and 1.7 percent of the total quantity placed in Nowlat and refrigerators respectively. Storage costs differ significantly averaging L.E. 2.5 in Nowlat

Table (1) Losses at the Farm Level

Potato Village	V ₁	V ₂	V ₃	V ₄
Total Production (Ton)	881.4	591	572	315.6
Quantity of Losses (Ton)	38.8	35.1	41.8	6.6
Percentage Losses	4.4	6	7.3	2.1
Tomatoes				
Total Production	892.5	228	441	
Quantity of Losses	72.3	22.3	73.9	
Percentage Losses	8.1	9.8	16.8	
Grapes				
Total Production	15.1	11.6	79.2	
Quantity of Losses	24.2	11.1	3.3	
Percentage Losses	1.6	9.7	4.2	

Sources: Data collected from the sample survey.

and 28.8 per ton in refrigerators. It has been noticed that those who stored in Nowlat had an average area of potatoes of 1.8 feddans and 4.3 feddans in villages 1 and 2 respectively, while those who stored in refrigerators, had an average area of potatoes of 9.6 and 7.1 feddans respectively, for V₁ and V₂.

B. Losses at Wholesale Level:

The sample of the dealers in the wholesale markets has been classified into three categories. The first category includes the dealers who throw away losses, the second includes those who sell at lower prices, and the third is those dealers who reported no losses. The total size of the sample aggregated across crops were 18.6 percent, 58.5 percent, 22.9 percent for the first, second, and third categories, respectively. They dealt in quantities which amounted to 24.3 percent, 50.0 percent, 25.7 percent of the total quantities in the three categories.

Loss estimates for the three commodities amounted to 11 percent in the first category with respect to the quantities dealt by wholesalers in this category and only 2.7 percent with respect to all the quantities in the three categories. In the second category quantity of the three crops which have been sold by lower prices as a result of losses or lower quality represented 14.3 percent of the quantities dealt in the second category and 7.2 percent of total quantities in the three categories. The price deduction was about 38 percent of the market price for these commodities.

1. Tomatoes

Sample size amounted to 31 dealers of which 9.5 percent, 81 percent, and 9.5 percent were in the first, second, and third categories respectively, and they dealt in 21.2 percent, 74.2 percent, and 4.6 percent of total marketed

Table 2 Losses of Potato Seeds According
To Storage Method

TRELLES								REFRIGERATOR						
Village	Number	Z	Area Feddan	A.V. Area Feddan	Cost Storage Ton/L.E.	Q Storage Ton	Z Losses	Number	Z	Area Feddan	A.V. Area Feddan	Cost Storage Per Ton L.E.	Q Storage Ton	Z Losses
V ₁	16	53	29	1.8	2.4	69	15.5	7	23	67	9.6	28.6	71	2
V ₂	1	3	4.3	4.3	4.0	6	10.0	6	20	42.5	7.1	29.3	37	1.2
	17	28	33.3	1.94	2.52	75	15	13	21	109.5	8.4	28.8	108	1.72

Source: Data collected from the sample survey.

quantities. The waste in tomatoes was 24.6 percent from quantities in the first category and 5.2 percent of the total quantities, while waste sold at lower prices represented 22.6 percent and 16.8 percent with respect to the quantity in the category and total quantities of the three categories respectively. Price deduction in the second category was 37 percent of normal market price. The Cairo market was more representative in the sample than was the Alexandria market, as indicated in Table 3. The percentage of losses in the first category in the Cairo market was 24.6 percent, 6.1 percent of the quantities in the I category and the total in the three groups respectively. However, in the Alexandria market no losses occurred in the first category. Instead, losses were concentrated in the second with 28 percent, 22.7 percent from the quantities dealt in the second category and quantities in the three categories respectively. The price deduction was about 36 percent.

2. Potatoes

The investigation of 30 potato dealers in Cairo and Alexandria showed that 33.4 percent of this number are in the first category dealing in and that they deal 37 percent of the total quantities of potatoes in the three categories. Losses were less than with tomatoes. It was found that about 5.9 percent of the quantity in the first category is thrown away and this quantity constitutes 2.2 percent of the total quantities dealt in the three categories. Thirty percent of the dealers and 23.1 percent of quantities were in the second category. The waste which is sold at lower prices was 4.1 percent of quantities in this category and 1.5 percent of total quantities with a reduction in the average price of about 36 percent. Those who sell all their product without waste or lower prices constitute 36.6 percent of the total dealers with a quantity of 39.8 percent of total quantities. None of the

Table(3) Losses at Wholesale Level for
Tomatoes, Potatoes, and Grapes

Aggregate 3 Crops		I	II	III
Size of Sample	74	13	41	
Percentage	100	18.6	58.5	22.9
Quantity	594,500	143,500	298,000	153,000
Percentage	100	24.5	50.1	25.7
Waste Percentage or Lower Prices	A	11	14.3	0
	B	2.7	7.2	0
Price Deduction			37.9	0
Tomato Aggregate				
Size of Sample	31	3	25	3
Percentage	100	9.7	80.6	9.7
Quantity	184,000	39,000	136,500	8,500
Percentage	100	21.2	74.2	4.6
Waste Percentage or Lower Prices	A	24.6	22.6	0
	B	5.2	16.8	0
Price Deduction			37	0
Tomato - Cairo				
Size of Sample	22	3	18	1
Percentage		13.6	81.8	4.6
Quantity	157,000	39,000	115,000	3,500
Percentage		24.8	73	2.2
Waste Percentage or Lower Prices	A	24.6	21.6	0
	B	6.1	15.8	0
Price Deduction			37.3	0
Tomato - Alexandria				
Total Size	9	0	7	2
Percentage	100	0	77.8	22.2
Quantity	26,500	0	21,500	5,000
Percentage	100	0	81.1	18.9
Waste Percentage or Lower Prices	A	0	28	0
	B	0	22.7	0
Price Deduction			36.3	
Potato Aggregate				
Total Size	30	10	9	11
Percentage	100	33.4	30	36.6
Quantity	281,500	104,500	65,000	112,000
Percentage	100	37.1	23.1	39.8
Waste Percentage or Lower Prices	A	5.9	4.1	0
	B	2.2	1.5	0
Price Deduction			36.	
Potato - Cairo				
Total Size	20	10	5	5
Percentage	100	50	25	25
Quantity	253,000	104,500	52,500	96,000
Percentage	100	41.3	20.8	37.9
Waste Percentage or Lower Prices	A	5.9	3.9	0
	B	2.5	.8	0
Price Deduction			35.8	
Potato - Alexandria				
Sample Size	10	0	4	6
Percentage	100	0	40	60
Quantity	28,500	0	12,500	16,000
Percentage		0	44	56.1
Waste Percentage or Lower Prices	A	0	5.3	0
	B	0	2.3	0
Price Deduction			40.5	
Grape Aggregate				
Sample Size	10	0	800	2,000
Percentage	100			
Quantity	129,000		96,500	32,500
Percentage	100		750	250
Waste Percentage or Lower Prices	A	0	9.4	0
	B	0	7.1	0
Price Deduction			30.1	

Source: Data collected from the sample survey.

wholesalers in the market reported Alexandria throwing their losses but 40 percent of the wholesalers in the second category dealt in 44 percent of the quantities. Their waste was 5.3 percent and 2.3 percent of the quantities dealt in this category and all quantities, respectively. They sell these lower grades with a 40 percent lower than usual market price.

3. Grapes

No losses have been thrown away either in the Cairo or the Alexandria wholesale markets. The waste in both markets is represented by lower qualities which were sold at a price discount of 30 percent. For the two markets about 9.4 percent of quantities were sold with lower prices with respect to the quantities in the second category and 7 percent with respect of the quantities in the three categories. The quantities in the second group were 75 percent and in the third they were 25 percent of total quantities.

Losses at Retail Level

The total sample size investigated for the three crops included was 160 retailers in Cairo and Alexandria of which 56 handled tomatoes, 53 handled potatoes, and 51 handled grapes. The quantity in the first category (loss thrown away) represented about 52 percent of total quantities in the three categories. Percentage of losses in this category is greater than that at wholesale market level; 13.6 percent from total quantity in the first category and 7.1 percent of total quantities in the three categories. Those who have losses but sell it at lower prices represented about 29 percent of the retailers who dealt in 31 percent of total quantities. The losses in the second category (product sold with lower prices) amounted to 16.1 percent of quantities dealt in this class and 4.9 percent of total quantities and were sold at about 32 percent lower than

normal prices. Retailers in the third category who reported no loss represented 17.2 percent of total quantities.

1. Tomatoes

It has been found that 73.1 percent of tomato retailers, dealing in 74 percent of total quantities of tomatoes in the two markets, throw away a part of their tomatoes.

The waste which is thrown away is 15.5 percent, 11.6 percent of quantities of tomatoes in the second and in the three categories respectively. Consequently at the retail level thrown losses with respect to total quantities is twice as much at the wholesale level. The waste which is sold at lower prices represents 20.3 percent of the second category but only about 4 percent of total quantities. The quantities handled by this group represented about 19 percent of total quantities. Those who had no losses were only 5.4 percent of the total number of retailers and their quantities dealt in was 5.9 percent of total quantities in the sample.

2. Potatoes

Losses in potatoes were much lower than that in tomatoes. About 60 percent of the retailers dealt in 35 percent of the quantity in the first category, but waste is only 4 percent from total quantities in the first category and 1.4 percent of the total quantities in the three categories. The potatoes which were sold with lower prices as a result of lower quality represent 11.3 percent of total quantity in the second category but only 4.4 percent of total quantities dealt in and they were sold at 40 percent lower than usual prices.

In both cases lower quality is bigger in Cairo market than in Alexandria market 11.7 percent, 5 percent from quantities in category two for Cairo and Alexandria respectively and 5.7 percent, 5 percent from total quantities dealt

Table (4) Categories of Dealers of Tomatoes, Potatoes, and Grapes at the Retail Market According to Loss Criteria

I THROW LOSSES									
	Category Sample Size	Number of Dealers	Percent	Quantity of Loss/KG	Quantity Dealt in I	Quantities in I, II, III	$\frac{\text{Loss}}{\text{I}}$	$\frac{\text{Loss}}{\text{I} + \text{II}}$	$\frac{\text{I}}{\text{I} + \text{II} + \text{III}}$
Tomatoes									
Cairo	41	34	82.9	648	4,285	5,355	15.1	12.1	80.0
Alexandria	15	7	47.0	276	1,660	2,600	16.6	10.6	63.7
Total	56	41	73.2	924	5,945	7,955	15.5	11.6	74.7
Potatoes									
Cairo	42	23	54.8	56	1,075	5,265	5.2	1.1	20.4
Alexandria	11	9	82.0	44	1,400	1,720	3.1	2.6	81.3
Total	53	32	60.4	100	2,475	6,985	4.0	1.4	35.3
Grapes (Romy)									
Cairo	32	13	40.6	101	1,020	3,090	9.9	3.3	33.0
Alexandria	13	7	53.8	368	1,980	3,366	18.6	10.9	58.8
Total (Romy)	45	20	44.4	469	3,000	6,456	15.6	7.3	46.5
Grapes (Bansty)									
Cairo	20	13	65.0	237.5	1,325	3,125	17.9	7.6	42.4
Alexandria	-	-	-	-	-	-	-	-	-
Total (Bansty)	20	13	65.0	237.5	1,325	3,125	17.9	7.6	42.4
Total (Grapes)	65	33	50.8	706.5	4,325	9,581	16.3	7.4	45.1
Total Sample	160	106	60.9	1730.5			13.6	7.1	51.9

Table (4) Categories of Dealers of Tomatoes, Potatoes, and Grapes at the Retail Market According to Loss Criteria

II									
SELL WITH LOWER PRICE									
	Category Sample Size	Number of Dealers	Percent	Quantity of Loss/KG	Quantity Dealt in I	Quantities in I, II, III	$\frac{\text{Loss}}{\text{I}}$	$\frac{\text{Loss}}{\text{I} + \text{II}}$	$\frac{\text{I}}{\text{I} + \text{II} + \text{III}}$
Tomatoes									
Cairo	41	4	9.8	125	600	5,355	20.8	2.3	11.2
Alexandria	15	8	53.0	188	940	2,600	20.0	7.2	36.3
Total	56	12	21.5	313	1,540	7,955	20.3	3.9	19.4
Potatoes									
Cairo	42	12	28.6	300	2,570	5,265	11.7	5.7	48.8
Alexandria	11	1	9.0	8	160	1,720	5.0	0.5	9.3
Total	53	13	24.5	308	2,730	6,985	11.3	4.4	39.2
Grapes (Romy)									
Cairo	32	17	53.1	285	1,470	3,090	19.4	9.2	47.6
Alexandria	13	4	30.8	133	756	3,366	17.6	3.9	22.5
Total (Romy)	45	21	46.7	418	2,226	6,456	18.8	6.5	34.5
Grapes (Bansty)									
Cairo	20	4	20.0	184	1,080	3,125	17.0	5.9	34.6
Alexandria	-	-	-	-	-	-	-	-	-
Total (Bansty)	20	4	20.0	184	3,306	3,125	17.0	5.9	34.6
Total (Grapes)	65	25	38.5	602	7,576	9,581	18.		34.5
Total Sample	176	50	28.7	1,223					

III

SELL ALL NO LOSSES

Number of Dealers	Percent	Quantity Sold/KG	Percent
3	7.3	470	8.8
-	-	-	-
3	5.4	470	5.9
7	16.7	1,620	30.
1	9.0	160	9.3
8	15.1	1,780	25.5
2	6.3	600	19.4
2	15.4	630	18.7
4	8.9	1,230	19.0
3	15.0	720	23.0
-	-	-	-
3	15.0	720	23.0
7	10.7	1,250	20.4
10	10.4	4,200	17.2

in the three categories.* The quantities in the third category is about 25.5 percent of total quantities which can be sold without losses.

3. Grapes

Losses which were thrown away represented 16.3 percent of quantities in the first category. This category represents about 45 percent of total grapes in the three categories and waste in this category was 7.6 percent of the total amount of grapes. In the second category, quantities which were sold with lower prices are 18.3 percent of the quantities in this category and 6.3 percent of total quantities. About 35 percent of total quantities were in the second category while the quantities in the third were only 21 percent of total quantities.

Prices for the lower quality grapes were about 30 percent lower than usual market prices.

Value of Losses:

As has been indicated, losses may occur at different stages in the farm to consumer marketing channel. Eliminating or reducing the size and value of losses increases the production available for the consumers in Egypt or to export. However, assessing the size of losses and their value may not be very useful if separated from the causes of these losses. As has been mentioned, losses are a complex problem of multi-dimensional nature and any achievements in this respect should be within a comprehensive framework which takes all factors responsible of losses into consideration. This will help in assessing

*Sorting operations at the farm, wholesale and retail levels are related in the sense that a high percentage of losses of the farm level may result in lower losses at wholesale and retail and vice versa.

the degree of responsibility of each variable causing losses. This paper indicates the estimated value of losses to argue that marketing facilities should be developed and marketing constraints should be eliminated, or reduced to obtain more usable and higher quality food. This will contribute to increasing agricultural income, national income, foreign currency and welfare of the Egyptian consumer. As indicated, there are some estimates of the value of losses which may occur from an inadequate marketing facility or operations. Storing potato seeds in Nowlat is an example. It has been found that there is a loss in value of about L.E. 20 for each ton stored in Nowlat.

If multiplied by the quantities of seed potatoes stored in Nowlat at the country level (about 49,000 tons) this means a total loss on the average of about L.E. 1 million. However, it should be noted that the questionnaire revealed that the difference in storage costs in Nowlat and in refrigerators is larger than the savings from refrigerated storage. In the first village the difference in storage costs was L.E. 26.2 in favor of the Nowlat, while the value of losses saved by refrigerated storage was L.E. 20, i.e., storing in Nowlat was more useful to the farmer because he could save about L.E. 6 per ton. In the second village the difference in storage costs was L.E. 25.3 in favor of Nowlat while the difference in value of waste was L.E. 13.2, i.e., the farmer can save L.E. 12 as a result of storing in Nowlat. That is why farmers tend to store their seeds in Nowlat despite the size of waste. The sample

*The area of Nili potatoes is about 74 thousand feddans (1978-1980). about 73 thousand tons of storage capacity are needed for seed potatoes. The refrigerated storage capacity of the cooperative society of potato producers is about 24 thousand tons or 33 percent of the total capacity needed for storage. This means that about 49 thousand tons of potato seeds will be stored in Nowlat.

could be extended to other regions. However, this indicator of high storage costs in refrigerators should be considered for any program for seed potato storage.

Value of Losses at Farm Level

The value of losses in the sample has been estimated for each village. For potatoes, the value of loss per ton of total production in each sample (four villages) amounted to L.E. 3.1, 4.2, 5.2 and 3.2, in V₁, V₂, V₃, and V₄ respectively calculated according to farm prices in each of these villages. The quantity weighted average was about L.E. 4. Consequently the value of loss at the country level according to total production in 1981 (1.22 million tons) was about L.E. 5 million. However, value of waste estimated here is a tentative method of estimation according to the limited size of the sample.

In case of tomatoes the value of losses in the sample amounted to L.E. 6.5, 7.4 and 11.4 per ton in V₁, V₂, and V₃ respectively according to value of total losses and total production in each sample. The weighted average of the value of losses for the sample in the three villages was L.E. 8.1 per ton. Total production of tomatoes in the country amounts to about 2.5 million tons, i.e., the total value of loss will amount to about L.E. 20.3 million at the country level. As for grapes, the value of losses per ton in the sample in the three villages amounted to L.E. 2.9, 17.7, and 7.5 in V₁, V₂, and V₃, respectively. The weighed average value of loss at the total sample level amounted to L.E. 5.2 per ton. The estimated total value of losses based on grape production of about 299,000 tons was about L.E. 1.6 million. This means that at the farm level the value of post harvest losses for the three crops

amounts to about L.E. 27 millions. The value of losses for potato seeds account for an additional L.E. 1 million.

In any case, when estimating losses from an economic point of view, overlapping should be considered, i.e., to estimate loss for any commodity, samples should be followed up to estimate the overall loss until it reaches the consumer or until it arrives to the foreign markets. Estimation of losses in different samples at different levels will not help very much in assessing the overall loss. However it is a complicated procedure to follow the same sample from the producer to the consumer but this will be considered in future research.

The value of losses is greater at wholesale and retail market levels than at the farm level. This is due to inadequate market operations in handling system. Losses may occur either as an absolute loss, which is thrown away by the dealers in the marketing system, or as a qualitative loss which is represented by lower prices charged at wholesale or retail. The deduction of prices as a result of lower qualities or qualitative waste ranges from 25 percent to 40 percent at the domestic market. Estimation of value of loss at these two levels could be accomplished by the same procedure. However, it is preferable to follow the sample to estimate loss as mentioned before.

Indicators of Losses for Exports

Some measures can be adopted when estimating the size of loss for export crops. However, they are more or less guidelines which need further elaboration.

Loss for export crops is much greater than loss for crops consumed domestically. Evidence was clear in the case of potatoes where the percentage of farm losses were much bigger in the villages oriented to exports. Grading

operations, which are rarely done for domestic consumption, are always done for the export market. Consequently the percentage of losses and/or culls exceeds that at the domestic markets.

The quantities of grapes exported during the last four years (1977/1980) by the exporting company (El Wadi) represent about 65 percent from the quantities purchased from the domestic market or at the farm level, while 35 percent were resold again. However, this percentage in 1977 was about 25 percent while 75 percent of the purchased quantity was resold to the domestic market. As an average for the last period the price per ton for the foreign market was about L.E. 906 while that which were sold to the domestic market by the company was about L.E. 346. The purchase price per ton was L.E. 225 and the marketing costs and expenses for the exported quantity was L.E. 150 per ton. These figures indicate to some extent the losses, as a result of the high percentage of culls which were not suitable for export.

The second kind of loss for export crops is represented by the commodity which was rejected at the airport or at the harbor by the agency supervising and controlling exports. The rejection of any part is to either waste or to not fulfilling the specifications for the exported commodity. In both cases it can be considered as loss. More investigation and study to assess such kind of losses and factors responsible for that loss are needed and will be considered in another paper.

The third kind of loss can be reflected in the quantities rejected at the importing countries. This may be attributed to spoilage from inadequate shipping conditions or as a result of not fulfilling the importer specifications for the commodity.

An example of this kind of loss in tomato exports is represented in the quantities rejected as different shipments. The value of compensation which

the exporter had paid the importer differed according to the payment method and to the importing country. In 1979, the Nile Company and Aswan office exported tomatoes. The value of exports were subject to two methods of payment, accounting dollar and free market dollar. The first shipment amounted to 326 tons and the second was 201 tons. The value of compensation that the company paid to the importer as a result of not fulfilling his specifications was about 5 percent of the total value of the quantity exported according to accounting dollars. In the second case it was 34 percent of the value of the shipment. In 1980 the compensation paid by Salam Company for the exported tomatoes amounted to about 19.5 percent of the total value of the quantity exported.

General estimation of post harvest losses for export markets may be as important as estimating domestic market losses in any amount of product loss results in the loss of badly needed foreign currency. Estimation of export market losses require substantial research efforts especially at harbors and at the shipping stage.

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Estimation of Post Harvest Losses

(ANNEX - THE SAMPLE)

A. At Farm Level

1. Potatoes:

El Monofia, El Behra, and El Gharbia are the main three governorates producing potatoes. They represent about 60 percent of the potato area and percent of potato production. Ashmon district from Monofia, Kom hamada, Kafr Eldowar from Behera and Karf El Zayat from Gharbia have been selected as the main producing districts in each governorate. Villages have been selected from each district according to the same criteria, Elbarania village from Ashmon (Monefia governorate), Abou El-Kawi and Difsho village from Komhamada and Kafrelowar districts respectively (Behera governorate) and Dalgamon from Kafr Elzayat (Gharbia). Thirty farmers were randomly selected from each village. The total size of the sample was 120 potato growers.

2. Tomatoes

Tomato production is more widespread than potato production. However, three governorates which represent about 40 percent of tomato area and percent of tomato production in Egypt have been selected. The three governorates are Elbehera, Giza, and El Ffayom. In Behera Kafreldowar district and Abis village were selected. In Elgiza, Imbaba district and Kirdasa village and in Fayom Absway district and Elmokrany village are the selected areas. Thirty farmers were selected from each village for a total sample of 90 farmers in the three villages.

3. Grapes

Grape production is mainly concentrated in three regions, Minya, Fayom, and Behera governorates.

These governorates cultivate the two main varieties, El Romi, and Fayom. Samaulat district and Klosna village have been selected in Minya. Absway district and Makrani village in Fayom and Janklis district in El Behra.

B. At Wholesale Level

Two wholesale markets were selected. Rod Elfarag in Cairo and El Nozha in Alexandria are the main wholesale markets for vegetables and fruits in the country. The frame of the dealers in each market have been investigated from the records and those who deal in the biggest quantities in each commodity through 1981 were selected.

From the rest, a random sample were selected to represent different dealers in the market in Cairo and in Alexandria.

The number of dealers sampled were 49 (70 percent) in Cairo and 21 (30 percent) in Alexandria. The number of dealers investigated for each crop was 31, 30, and 9 for tomatoes, potatoes, and grapes respectively. The number investigated in each commodity represented most of the dealers in the market.

C. At the Retail Level

Four retail markets have been investigated in Cairo, namely Zamalek (M₁), Sakia Miki (M₂), Soliman Goher (M₃), and Shobra (M₄). These markets represent high income levels (Zamalex), medium income levels (Soliman Goher and Shobra), and low income class levels (Sakia Miki). However, incomes lend is a subjective measure. For tomatoes, 41 retailers were investigated in Cairo and 15 in Alexandria. The number of retailers in each market were 10, 13, 10, and 8 in the Cairo market, Zamalek, Sakia Miki, Soliman Goher, and Shobra, respectively. In Alexandria interviews were conducted with four retailers in each market, Manshia, El Nozha, Karmoz, Bacos, and Kilobatra.

As for potatoes, Cairo retailers were selected in M₁, 12 in M₂, 12 in M₃, and 8 in M₄. In Alexandria, four retailers selected in each market. There were 51 retailers who handled grapes, 38 in Cairo and 13 in Alexandria in the same markets mentioned above. In Cairo 10, 9, 10, 9 in M₁, M₂, M₃, and M₄ respectively and 3-4 in each market in Alexandria.

