

harvesting, and marketing costs. A yield of 1,025 boxes (25 lb.) at \$6.00 per box provides an estimated net return of \$166 per acre. The 1,025 cartons is equivalent to 12.8 tons per acre.

Summary

The utilization of salvage tomatoes from fresh market production with no additional inputs provided the highest returns per acre of the processing production systems analyzed. Net returns of \$120 per acre are projected at a yield of 6 tons per acre and a price of \$60 per ton.

Production of processing tomatoes with high input levels resulted in a net loss at maximum anticipated yields per acre (30 tons) and maximum price per ton (\$70).

Production of processing tomatoes with low input levels resulted in a net return of \$21 per acre with maximum anticipated yields of 30 tons per acre and a price of \$70 per ton.

Fresh market tomato production resulted in a net return of \$798 per acre with a yield of 1,250 boxes (25 lb.) and a price of \$6.00 per box.

The lower solids content of Florida tomatoes (Table 3) is an additional negative factor in the processing of concentrated tomato products.

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THE ORANGE BLOSSOM SPECIAL: THE FIRST TWO YEARS

RICHARD BEILOCK
*IFAS, University of Florida,
 Food and Resource Economics Department,
 Gainesville, Florida 32611*

GEORGE FLETCHER
*Florida Department of Agriculture
 and Consumer Service,
 Tallahassee, Florida 32301*

Abstract. In November 1982, the Seaboard System Railroad initiated the Orange Blossom Special (OBS), a dedicated trailer-on-flatcar train moving produce to the Northeast 6 to 7 days per week. This development was a dramatic departure from the almost passive ceding of such traffic to motor carriers in the 1970's. During that period, the railroad's share of Florida's produce movements fell from over one third to less than 1%, and many predicted complete cessation of produce traffic by rail. Now, however, the picture is radically altered. Since November 1982, the OBS has enjoyed increases in the volumes carried and the variety of commodities handled, and service levels appear to be high. In this paper the history of the Orange Blossom Special and its role in the Florida produce transportation system are detailed.

On November 15, 1982 a major innovation was introduced in the transportation of Florida perishables—the Orange Blossom Special (OBS). The OBS is a train dedicated exclusively to carrying perishables in trailers-on-flatcars (TOFC) between Florida and Delaware. The service runs 6 to 7 days per week from late October through mid-July. Prior to November 1982, the railroads had virtually disappeared from the perishables transport scene. In this paper the events leading up to the initiation of the OBS and the history of its first two years of operation are reviewed. The implications of this service to the Florida perishables industry are assessed, and a brief view is given of the probable future course of events in Florida for rail transport of perishables.

Florida Perishables Transport 1955/56-1983/84

Modal split: 1955/56-1981/82. Since the advent of long distance trucking in the early decades of the century, the railroads experienced a steady erosion of their market share of Florida fresh fruit and vegetable (FFV) movements. By the 1960/61 crop year trucks accounted for over two thirds of surface transport of Florida FFV. Between the 1955/56 and the 1960/61 crop years the volume carried by rails fell by a third and their market share fell from 38 to 30% of surface FFV movements (Fig. 1).

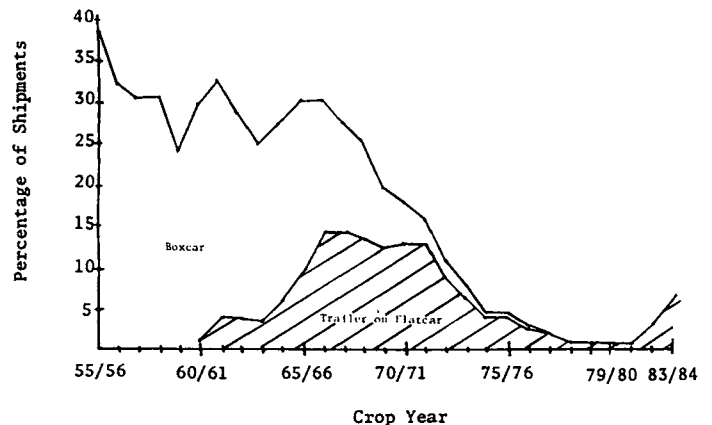


Fig. 1. Percentage of surface shipments of Florida fresh fruits and vegetables shipped via rail: 1955/56-1983/84 crop seasons. Source: Federal State Market News Service (3).

The 1960/61 crop year was also a year of opportunity for the railroads. In that year shipping FFV via TOFC was introduced. Through the 1960's TOFC shipments of FFV grew from 0 to almost 15% of the market (Fig. 1). This growth offset the continuing declines in FFV shipments via boxcar. From the 1966/67 crop year onwards, however, TOFC shipments stabilized and then declined sharply throughout the 1970's. By the 1977/78 crop year boxcar

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loadings had all but ceased (and stopped completely by the 1980/81 crop year) and TOFC was down to 1% of total surface movements. Many predicted the imminent cessation of all TOFC movements of Florida FFV.

There are several reasons why the railroads failed to maintain their market share, even with the advent of TOFC. They include:

1. low and stable fuel costs until 1973 which favored fuel intensive modes such as trucking,
2. the regulated status of FFV rail movements did not allow rate/service adjustments, and
3. spreading out of urban populations into suburbs made deliveries from railheads more difficult.

All of these factors would not have affected rail's share of traffic, however, had there not been an alternative for shippers.

That alternative, of course, was and is motor carriage. With construction of the U. S. Interstate System; development of larger, more powerful tractor-trailers; and continued freedom from economic regulation, truckers increasingly were able to offer a service generally conceded to be superior to rails (both boxcar and TOFC) in terms of speed, cargo handling and smoothness of ride, ability to monitor loads, and reliability of pickup and delivery times (6). For high valued, easily damaged and perishable commodities such as FFV, these service advantages were crucial—outweighing any advantages the railroads were able to offer in terms of lower freight rates. An indication of the erosion of rail's service image in relation to trucking may be seen in the commodity mix carried by TOFC. During the late 1960's and the 1970's the volumes of higher valued, more damage prone, and shorter lived types of FFV shipped via TOFC were sharply reduced or eliminated. Over the same period the volumes shipped via TOFC of potatoes and radishes, two relatively durable and low valued types of FFV, increased fourfold and their share of all Florida TOFC shipments increased from almost 0 to 96% (Fig. 2).

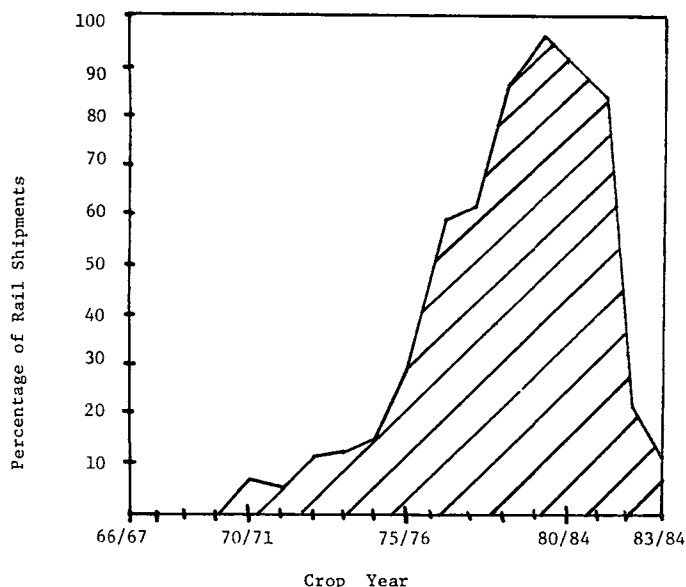


Fig. 2. Percentage of rail shipments of Florida fresh fruits and vegetables which were radishes and potatoes: 1966/67-1983/84 crop years. Source: Federal-State Market News Service (3).

As the service advantage swung to trucking most railroads deemphasized FFV traffic, choosing to concentrate on nonperishable, bulk commodities, such as coal and grains. Both to employ already owned equipment and because regulatory restrictions hampered the railroad's ability to exit from all or parts of the FFV market, an aging and

shrinking fleet of refrigerated vehicles continued to be used throughout the late 1960's and 1970's. Use of older equipment, underscored further in the minds of shipper/receivers the image of the railroads as a second class form of FFV transport. In many cases this image of poor service was exaggerated well beyond actual levels (7).

Modal split: 1981/82-1983/84. Since the 1981/82 crop year the market share of Florida FFV transport by TOFC has rebounded from 1% to almost 8% (Fig. 1). Virtually all of this growth has been to Northeast markets. In that region between 1981/82 and 1983/84 the market share for TOFC has gone from near 0% to around 16%. Moreover, the commodity mix carried on TOFC has broadened (note the collapse of the share of TOFC movements that were radishes and potatoes from 84% to 12% between the 1981/82 and 1983/84 crop year (Fig. 2)). A milestone in this turn-around was a semi-experimental Plan 3 TOFC program in 1981/82 operated by the Florida Fruit and Vegetable Association (Plan 3 TOFC refers to movements in which the shipper/receiver owns the trailer and supplies carriage to and from the railheads). In the 1981/82 crop year the Florida Fruit and Vegetable Association initiated such service for its members by leasing 55 trailers from Co. Operative Shippers, Inc., a Chicago based shippers association) and the initiation of the Orange Blossom Special (OSB) by the Seaboard System Railroad (SBD) from 1982/83 onward.

Three major factors may be cited as facilitating the re-emergence of TOFC for Florida FFV movements: rising fuel costs, technological developments, and regulatory changes. Of the three, rising fuel costs is most frequently pointed to as an explanation of renewed vitality in the railroads. Railroads are generally accepted as requiring less fuel per ton/mile than motor carriers. It follows, therefore, that increases in fuel costs raise the costs of generating a ton/mile more for motor carriers than for railroads. This effect, however, can be and probably has been over-emphasized. As can be seen in Fig. 1 the most rapid declines in rail service for Florida occurred during the 1970's in the face of unprecedented increases in fuel prices. The probable reason for the inability of rising fuel costs to stem the decline of Florida FFV rail shipments is that effective fuel efficiencies depend crucially upon the ratio of empty to full mileage. For example, if TOFC uses half the fuel per mile of a truck but always returns empty, there is no fuel-related advantage relative to a motor carrier with loads in both directions. The full return rate for trucks hauling perishables has been estimated to be on the order of 70% to 85% (2, 5, 6, 8). On the other hand, the full return rate for produce carrying TOFC units for the pre-1980 period was very low, estimated by Manalytics (6) at 25%. Therefore, without improved performance with respect to the percentage of full mileage, the advantage to rails relative to motor carriers of increased fuel costs were lessened.

Of considerable importance in the recent increase in rail movements of Florida FFV has been technological advances for TOFC. Four major areas may be identified: climate control, on and off loading trailers from flatcars, flatcar design, and communications. Improved climate control units (CCU) have greatly reduced the need for frequent inspections. Modern CCU are highly reliable and will shut down in the unlikely event that the prescribed temperatures are not being met (older CCU could go into cycles where they would 'cook' or freeze loads). Procedures and equipment for on and off loading trailers from flatcars have been greatly improved over the past 10 years. Transferring a trailer from road to flatcar or the reverse formerly was complicated, time consuming, and entailed some risk for the trailer and cargo. Today however, a trailer can be

lifted onto or off a flatcar in 2 min, employing a specially designed mobile crane and 2 or 3 workers. New flatcar designs have greatly reduced tare weights and lowered the clearance requirements for TOFC. Lower clearance requirements have been particularly important in the Northeast. For example, TOFC trains can now negotiate the Baltimore Tunnel, an important gateway to the Northeast. The final area of improvement is communications. Perishables require expedited service. Providing such service requires sophisticated communications. This is particularly true for TOFC with its added complexity of at least two intermodal transfers. Recent developments in microcomputers and telecommunications have greatly eased coordination problems. Moreover, these technologies are of value in processing day-to-day orders for transport with their details of pickup times, required temperatures, etc.

The final and probably the most important development contributing to the resurgence of TOFC in Florida FFV transportation is regulatory reform. The acts or rulings of particular importance in this regard are:

1. Ex Parte 346, Sub. 1 (1979)—Exempted rail movements of FFV from ICC regulation.
2. Staggers Rail Act of 1980—Increased rate flexibility, eased exit restrictions, lowered barriers against mergers, and empowered the ICC to exempt broad classes of traffic.
3. Ex Parte 230, Sub. 5 (1982) and Sub. 6 (pending)—Exempted virtually all TOFC traffic.

These reforms effectively removed the regulatory restrictions surrounding TOFC service both for FFV and manufactured goods. These freedoms allowed railroad managements to exploit fully the new technologies and the inherent fuel economics related to TOFC service. In particular, the railroads were free to alter rate/service packages in order to maximize their revenue generating capacity both on the northbound FFV run and the return trip to Florida. The merger of the Seaboard and Chessie railroad systems to form CSX also helped facilitate TOFC service for Florida FFV. This is true because the merger created a single line (i.e. one railroad) route between Florida and Delaware, thereby avoiding time consuming interlining between railroads and the complications associated with revenue sharing arrangements.

Orange Blossom Special Service Characteristics

On November 15, 1982 the recently formed CSX system initiated the Orange Blossom Special, a dedicated TOFC train for perishables operating 6 to 7 days per week. The train originates at the Taft yards in Orlando and terminates in Wilmington, Delaware. From there trailers are moved over-the-road to the receivers. The areas served are the Northeast and eastern Canada (Table 1). The rail movement is given top priority and completes the Florida "to" Delaware run in about 24 hr. The route for the OBS has passenger grade trackage to minimize vibrations to the cargo (the same route is used by Amtrak). Door-to-door transit times are comparable to or only somewhat slower than for over-the-road movements (Table 1). Except for Montreal, they are roughly identical to the times achievable by a motor carrier obeying Federal speed and hours of service regulations.

Thanks to advances in flatcar designs, and CCU slung under the trailers (rather than on the front), the OBS is able to use 45-ft trailers and load two per flatcar. The fleet of refrigerated trailers numbers almost 1,000 with 60% being 102-inch wide units under 2 yr old (Table 1). The trailers and CCU undergo regular servicing to maintain equipment reliability.

Perhaps the most important aspect of the service offered

Table 1. Orange Blossom Express service characteristics.

Origin TOFC ^z ramp: Orlando, Florida		
Destination TOFC ramp: Wilmington, Delaware		
Frequency of service: 6-7 days/week, October-July		
Equipment: Primarily 45 ft X 102 inch and 45 ft X 96 inch refrigerated trailers, most under 2 yr old. Total refrigerated trailer fleet = 997. Vented trailers employed in some cases for watermelons and potatoes.		
Areas Served: In the United States—Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, West Virginia, Virginia; In Canada—Maritime Provinces, Quebec and Ontario (eastern).		
Transit time: Ramp-to-ramp (rail portion): 23-25½ hr.		
Door-to-door:		
Approximate delivery times (hr since pickup) ^y		
Destination	OBS	Truck ^x
Philadelphia	35	27-32
New York	37	30-36
Boston 42	35-43	
Montreal	67 ^w	41-49

Claims and carrier liability: Seaboard System Railroad accepts full liability for all cargoes except watermelons. Claims must be filed within 60 days of delivery. While exact data regarding claims are not available, the claims problem appears to be small.

^zTOFC = Trailers on flatcars.

^yAssuming 3:00 PM pickup

^xTruck times were estimated as follows:

	Low estimate	High estimate
Average speed	55 mph	55 mph
Ratio of driving time to total trip time:	0.66 (driving 16 for every 24)	0.55 (driving 10 for every 18 hr in accordance with U.S. DOT hours of service rules)
	Mileage	
Philadelphia	1000	1000
New York	1100	1100
Boston	1300	1300
Montreal	1500	1500

^wThis assumes third morning delivery, as is advertised in SSR literature. It is not uncommon, however, for second afternoon deliveries to be achieved, lowering the total delivery time to around 50 hr.

by OBS is that from the point of view of the shipper and the receiver, the service is much like motor carriage. Multi-trip contracts are not required of customers. Service is usually ordered one trailer at a time, though periodically volume discounts are available. The service may be ordered over the phone, and there is one bill of lading to cover the entire trip (For some TOFC arrangements carriers assume responsibility for portions of the movement (such as drayage between the shipper and the originating TOFC yard). In such cases the purchaser of the service may have several bills of lading and be required to negotiate with several carriers). Finally the drayage firms subcontracted to bring the trailers to and from the railheads were selected by Seaboard System Railroad based on their experience with perishables.

History: The First Year 1982/83

The first year of operations for the OBS may be divided into two periods—before the truckers' strike and after the strike. From its initiation in November until the Independent Truckers' Association (ITA) truck strike (January 31, 1984 through February 10, 1984) the volumes shipped via the OBS were small. Shipments via all TOFC (OBS and non-OBS) for this period rarely accounted for over 1% of all surface movements (Fig. 3). Reasons for this slow start include shipper/receiver hesitancy to 'experiment' with a new, untried service; a general surplus of trucks, and un-

usually cool, wet weather in January which slowed harvests. Throughout this period the Agricultural Marketing Service of the USDA (9) reported either light surpluses or surpluses of trucks. These are defined as follows: *Surplus*: Supplies of trucks exceed shippers' needs. Many truckers waiting 2 or more days for a load, willing to accept loads to undesirable destinations. *Slight Surplus*: Supplies of trucks slightly exceed shippers' needs. Truckers more selective of destinations, but shippers have little difficulty obtaining trucks for all destinations. Throughout this difficult period, the management of SBD never wavered in its commitment to prove that the OBS was a viable FFV transport system. Some nights the OBS made its run with only a few of flatcars and trailers. Though such movements cost far in excess of revenues generated, they were seen by the railroad's management as necessary to demonstrate reliability.

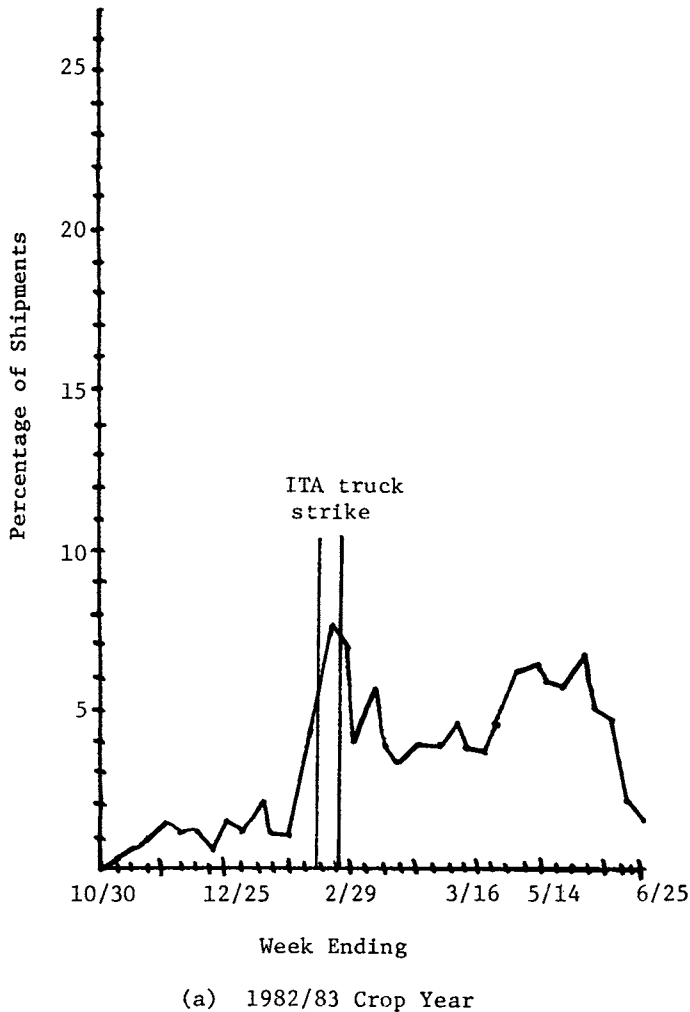


Fig. 3. Percentage of surface shipments of Florida fresh fruits and vegetables via trailer on flatcar: 1982/83 crop year. Source: Federal-State Market News Service (3).

In January with the approach of the ITA strike shippers and receivers looked to the OBS as an alternative transport mode. While the strike was not particularly severe and was of fairly short duration, considerable volumes of FFV were diverted to rail. At the height of the strike TOFC accounted for over 8% of total shipments (Fig. 3, 4). Not surprisingly, after the strike the volume shipped via TOFC fell. However, what is of most importance is the fact that the volumes shipped via TOFC remained far above prestrike levels. After the strike, TOFC consistently accounted for over 4% of total surface FFV movements as opposed to 1% or less prior to the strike. It is evident from these figures and

from interviews with shippers and receivers (1) that many who were introduced to the OBS because of the strike were suitably impressed to continue using the service.

History: The Second Year 1983/84

In its second year of service the OBS continued to expand with respect to total volume, types of commodities and areas served. Unlike the previous season with its very slow start (Fig. 4), for the entire season rail accounted for almost 8% of all surface FFV movements, a level not realized since 1973. Handling of these increased volumes was made possible by a 250% increase in the fleet of refrigerated trailers from 400 to 997. Ornamentals, meat, imported perishables (such as bananas), and citrus concentrate were among the commodities introduced to OBS in 1983/84. Eastern Canada was added as a major destination area served. In 1983/84 one load in 14 shipped on the OBS was delivered to a Canadian receiver.

In short, in the second year of operation, the OBS showed itself to be an established and growing fixture in the Florida FFV transport market. Despite a severe freeze in December and a surplus of trucks during all but the last few weeks of the season, the OBS remained competitive.

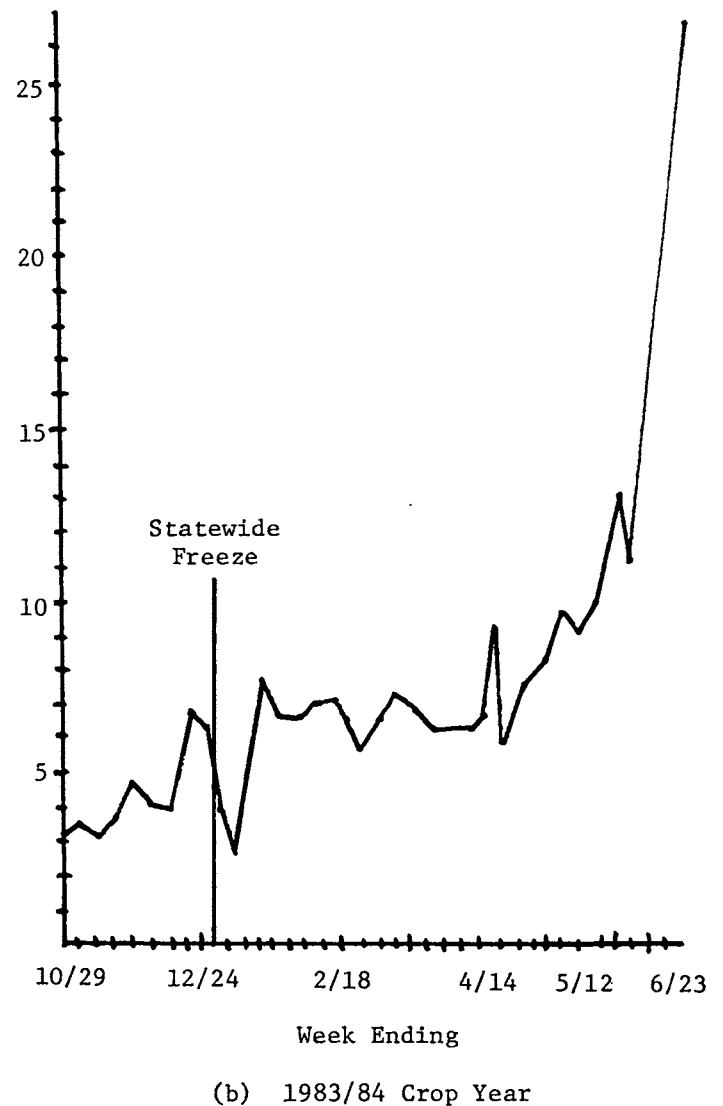


Fig. 4. Percentage of surface shipments of Florida fresh fruits and vegetables via trailer on flatcar: 1983/84 crop year. Source: Federal-State Market News Service (3). (Note: The very high levels at the end of the season reflects primarily a large volume shipment of watermelon via trailer on flatcar.)

The variety of commodities carried showed that the OBS was not becoming overly dependent upon a narrow sector of the perishables industry (Fig. 5). Moreover, the ability to attract high valued, damage prone commodities such as tomatoes, ornamentals, and vegetables indicates that the railroad was at last beginning to shake off its image as a lower quality transportation alternative.

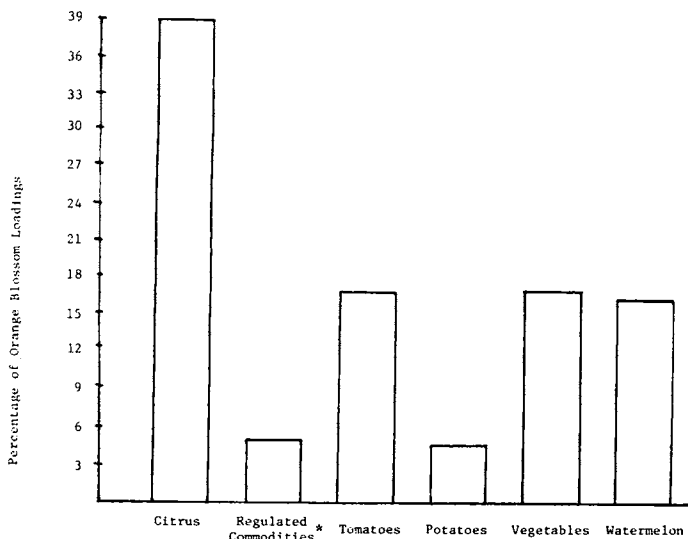


Fig. 5. Percentage share of commodities carried on the Orange Blossom Special: 1983/84 crop year. Source: Seaboard System Railroad records. *Concentrate, meat, and imported perishables. (Note: A small number of ornamentals loads were also shipped via the Orange Blossom Special.)

Prospects for the Future of Rail Movements of Florida Perishables

Given the success of the first 2 years of the OBS, few continue to anticipate an early end of rail shipments of Florida perishables. Indeed some foresee a complete reversal of the current picture with motor carriers becoming the marginal carriers struggling for survival. At present neither extreme appears likely. The Seaboard System Railroad will be concentrating over the next season, at least, on maintaining and refining their service and expanding their commodity base. Ornamentals, imported perishables, and perishables shipped overland in preparation for export are some likely areas of growth. In essence the Seaboard System Railroad wants to consolidate the gains made to date before considering major expansions.

When and if expansions are made they will probably be in the form of additional trains along the current route utilized by the OBS or new service to the Midwest east of the Mississippi. CSX has trackage as far west as St. Louis and Chicago and reaching northward into the lower peninsula of Michigan and eastern Ontario. The perishables markets in these areas are second only to those in the Northeast in importance to Florida producers. Therefore given continued success with the OBS, it is likely that Seaboard System Railroad will look to this area. Again, however, it should be stressed that the current emphasis is on maintaining and improving the OBS, rather than finding new worlds to conquer.

It is doubtful, however, even if the railroads aggressively sought to expand traffic, if they could soon regain dominance over trucking. The principle cost advantages associated with rail over truck are lower fuel and labor expenditures per unit distance. Trucks, on the other hand, have certain advantages not closely related to distance. Truck schedules can be more flexible as there is no train to catch, routes can be more varied, and the costs associated with road-to-rail and

rail-to-road transfers are avoided. For very long distance movements, such as transcontinental runs, the distance related advantages of rail tend to dominate. Over shorter distances, however, trucks often hold the advantage. Most Florida perishables are marketed east of the Mississippi. Total distance to market rarely exceeds 1,500 miles and often is under 1,000 miles. Moreover, the rail portion of a delivery frequently must end several hundred miles short of its destination (for example, OBS service to Montreal is over-the-road beyond Delaware). This further reduces the railroad's ability to exploit distance. Given this situation, it is difficult to see how the railroads could gain general dominance in the Florida perishables transport market. Rather, what is likely to evolve is a mixed system in which trucks continue to serve most or all areas but with rails having a cost and, perhaps, a service advantage in the areas surrounding their northern railheads for expedited trains such as the OBS (this pattern was also suggested in the findings of Klindworth and Brooks (4)).

Summary and Conclusions

After several decades of decline from dominance to near extinction rail transport of Florida perishables is making a comeback. The primary feature in this turnaround is the Orange Blossom Special. In its first 2 years of service it raised rails' share of Florida fresh fruit and vegetable traffic from 1 to 8%. This was accomplished in the face of almost chronic surpluses of trucks, slow harvests, and a severe freeze.

It appears clear from the first 2 years that the OBS is here to stay for the foreseeable future. Indeed, continued expansion of the service in the Northeast and possibly new service in the Midwest seems likely in the future. The OBS, however, does not herald the imminent end of the motor carrier as the dominant mode for Florida's perishables. Rather, there will develop a dual system with trucks continuing to carry the major share of the load, but with rails concentrating on those areas in which they have an advantage due to factors such as the distance to market, proximity of rail facilities, and availability of backhaul loads.

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